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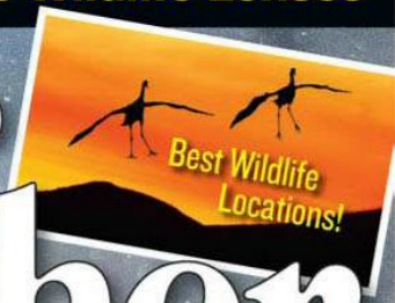

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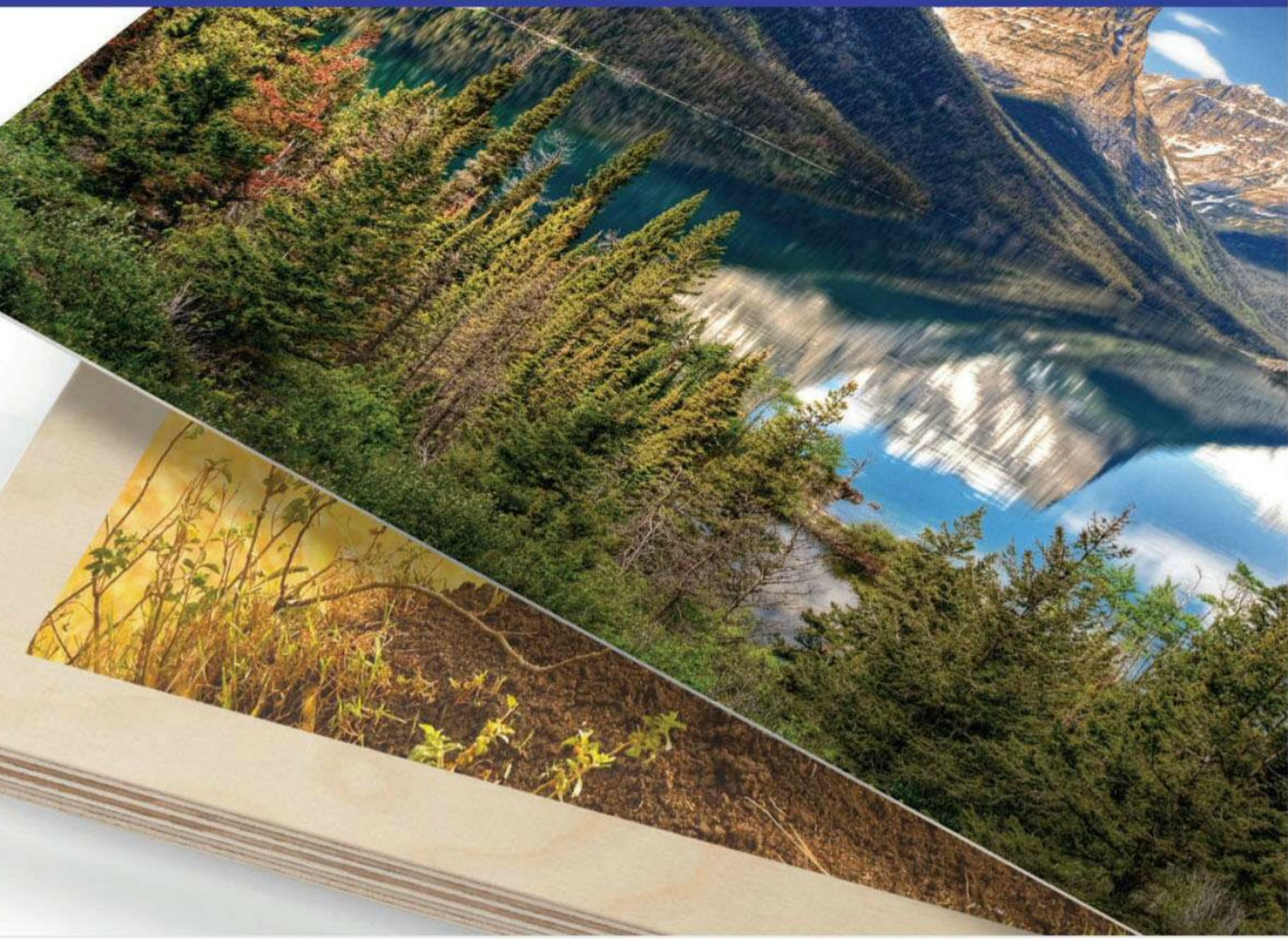

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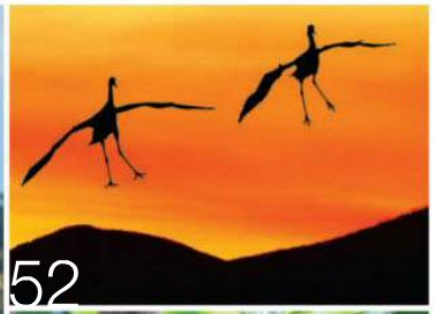

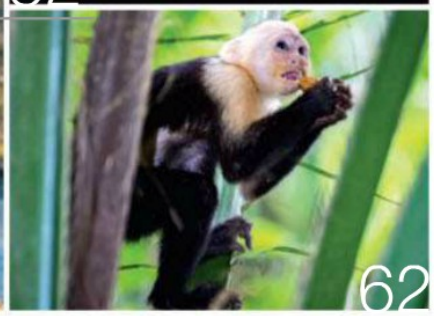

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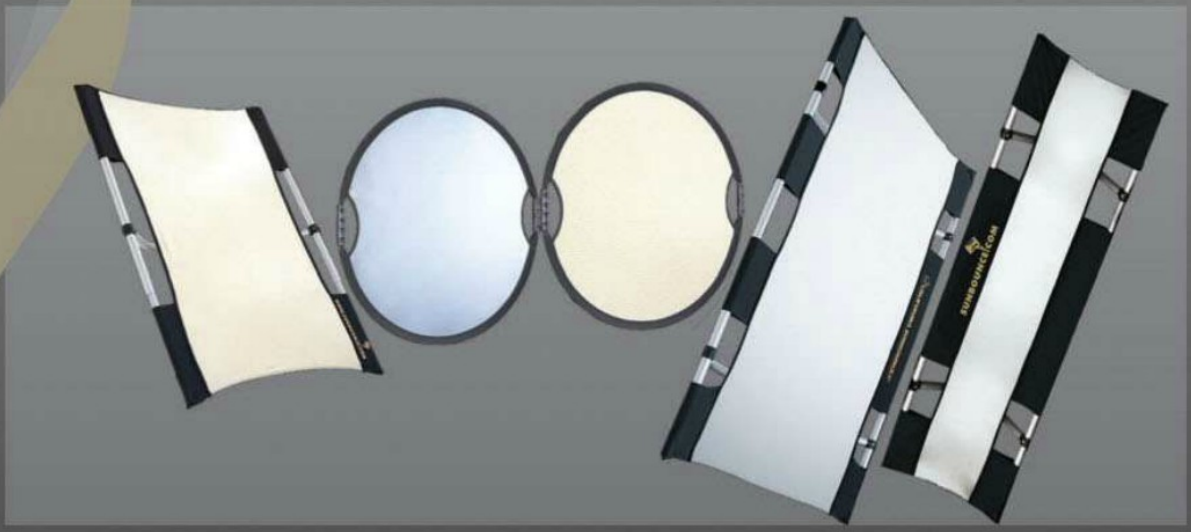

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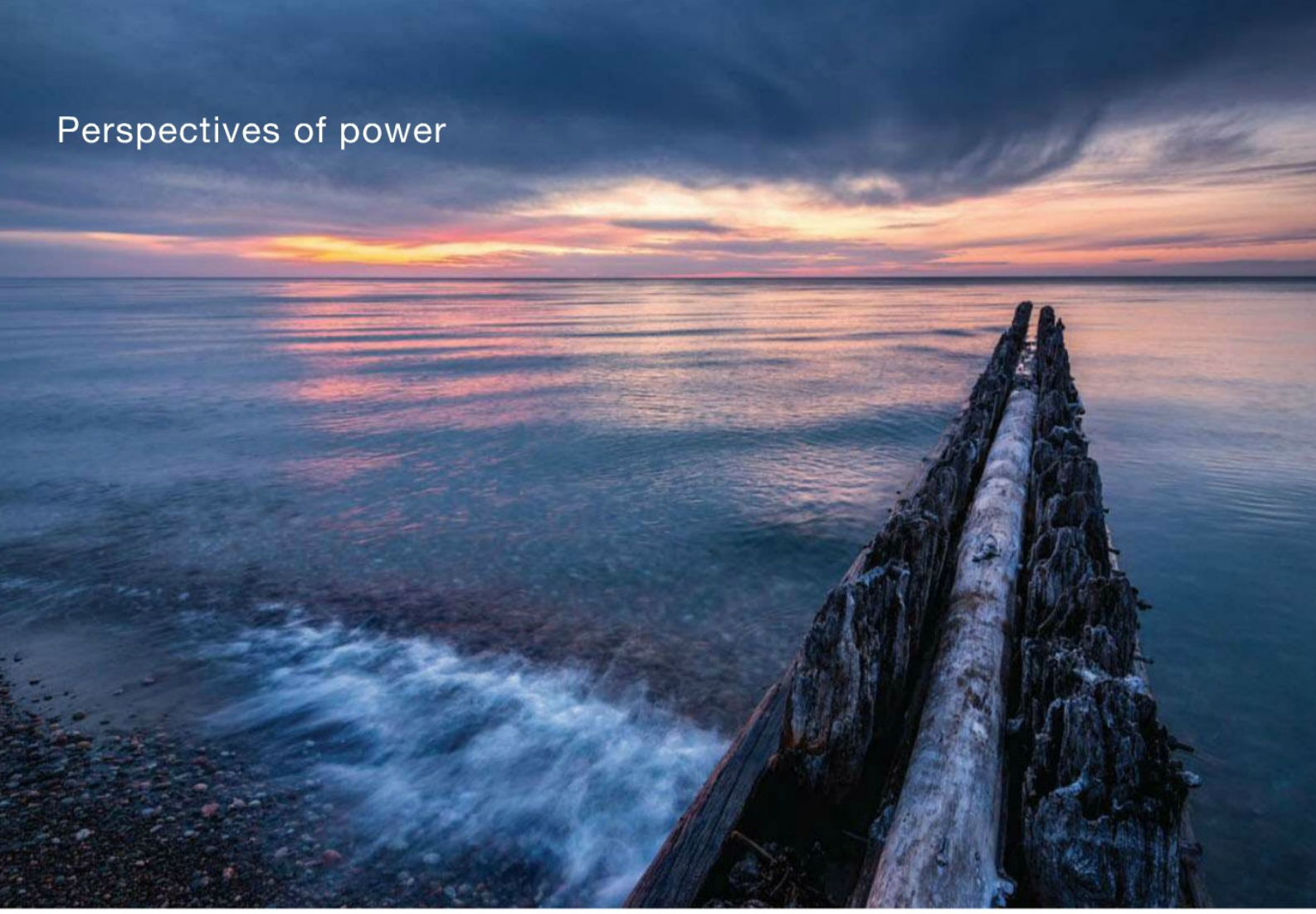

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new

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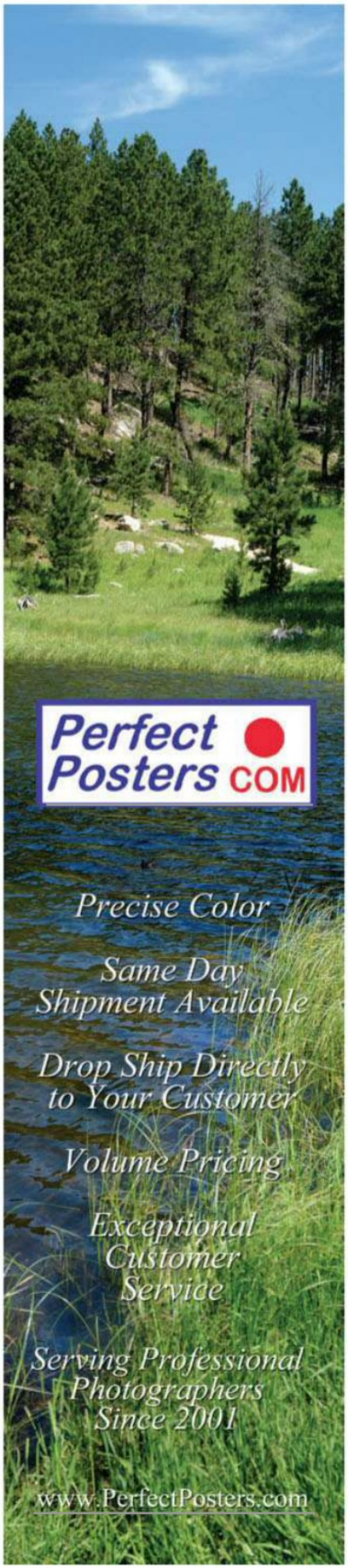

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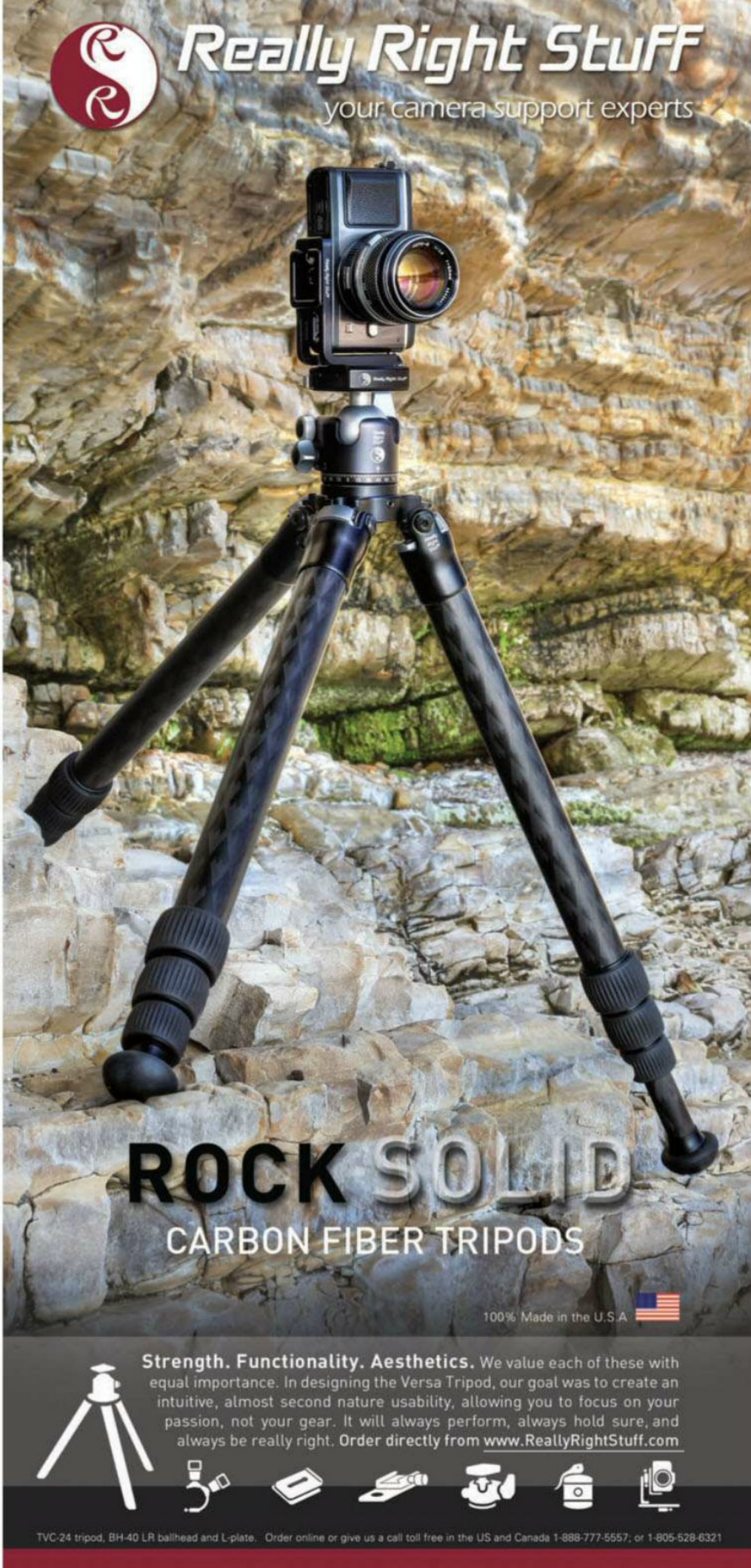
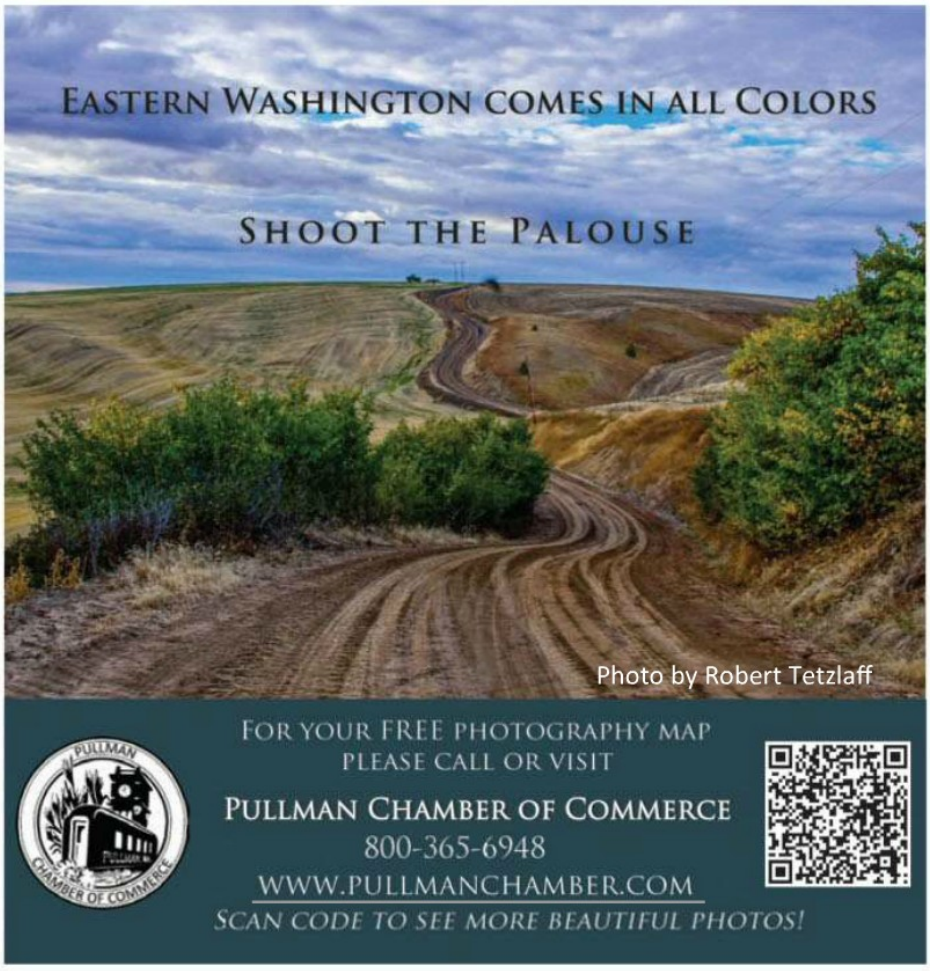
Photographer: Sandy Sisti
Location: Shoshone National Forest, northwestern Wyoming
Equipment: Canon EOS 5D Mark III, Canon EF 100-400mm *f*/4.5-5.6L IS USM
Situation: Every autumn, a small herd of bull bison leaves Yellowstone National Park to winter in the Shoshone National Forest in northwestern Wyoming. These bison make the long journey over 8,524-foot-high Sylvan Pass, through Yellowstone's East Entrance, to spend the next six months along the North Fork of the Shoshone River. Although this low-elevation winter range is more hospitable than the high country of Yellowstone, it's plagued by howling winds, which often gust over 70 mph. The bison are a familiar sight during the winter months, as they move from meadow to meadow in search of the forage that sustains them until spring.

On the morning this image was taken, I drove up the North Fork Highway hoping to photograph the bison in the softly falling snow. I saw a lone bison bull approaching. I pulled my car off to the side of the road and watched the big bull as he ambled down the highway. Thinking that this might lead to a good photo opportunity, I positioned my vehicle about a half-mile away in an area where I could view the bull's approach. Since bison can be extremely dangerous, I thought it best to photograph the bull from the safety of my vehicle, so I set my camera and lens on a beanbag and waited. After photographing him, I had just enough time left to get my vehicle out of the bison's way so he could continue on his journey undisturbed.





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Sandy Sisti

As nature photographers, we're a primary motivation for camera manufacturers to come out with higher and higher res models. We're on a never-ending quest for more detail in our photos and, more than any other group of enthusiasts, we like to make prints...big prints. Sure, more pixels, more problems, but thinking back to that early 2-megapixel camera from where we are today, I'm looking forward to the many technological leaps that ultimately will get us to 100 megapixels and more.

If some is good and more is better, then too much should be just right. That certainly has been the trend when it comes to camera resolution. Shortly before this issue went to press, **Canon announced a pair of new EOS 5D DSLRs with 50-megapixel sensors**. Since the Canon announcement, various rumor sites have been predicting new 50-megapixel cameras on the horizon from several manufacturers.

How much is enough? I don't intend that to come across as curmudgeonly, but as a serious question. About 18 years ago, I met with executives from a camera company who were showing their latest digital camera. It was early in the days of digital, and the camera had a 2-megapixel sensor. At the time, there were some higher pixel counts coming out, and sitting in a conference room at the office, we asked if there would be a higher-resolution model anytime soon. The answer was something to the effect of 2 megapixels is enough for most people.

That story is reminiscent of the urban legend stories of Bill Gates saying that 640K should be enough for everyone (he never actually said this, but that hasn't stopped it from being quoted to this day). Looking back on that 2-megapixel camera, and the statement that it should be enough resolution for anyone, inspires one to shake one's head and chuckle. But here's the thing—at the time, it was a legitimate statement. There were only a couple of higher-resolution models available and they had significant problems with power consumption (batteries that lasted about 10 minutes to a charge), onboard memory (CompactFlash was new and capacities were measured in megabytes), boot-up times (it took about 30 to 45 seconds from switching the camera on to being ready to shoot) and more. Also, once you had filled your memory card, you would have needed a relatively new computer with the latest processors and a lot of internal memory just to open the image. With all of that in mind, 2 megapixels was *more* than enough for most people.

Technology leapfrogs ahead, and I sit here today marveling at 50-megapixel Canon DSLRs that are possible because all aspects of technology have leapt ahead. At the same time, the new Canons will have the same problems, relatively speaking. How long will the batteries last as the multiple onboard processors chug through files from a 50-megapixel sensor? If you have 64 GB memory cards, they will get filled fast if you're shooting RAW files. Once you've filled the card, you'll feel the painfully slow file transfers and the spinning rainbow of death if you aren't working with relatively new hardware.

As nature photographers, we're a primary motivation for camera manufacturers to come out with higher and higher res models. We're on a never-ending quest for more detail in our photos and, more than any other group of enthusiasts, we like to make prints...big prints. Sure, more pixels, more problems, but thinking back to that early 2-megapixel camera from where we are today, I'm looking forward to the many technological leaps that ultimately will get us to 100 megapixels and more. There has never been a more exciting time to be a photographer.

—Christopher Robinson, Publisher/Editor

SHOW CASE

Look Closely

John Shaw has been a professional nature photographer since the early 1970s. His work has been published in *National Geographic*, *Nature's Best*, *National Wildlife*, *Audubon* and many others. Shaw took this photo in Bosque del Apache National Wildlife Refuge. The refuge is renowned for sandhill cranes and snow geese, but as Shaw explains there's much more to see and photograph: "[There are] other species of birds, mammals including deer, peccaries and rabbits, plus landscape possibilities. This great variety within a small area makes Bosque special; there's always something to photograph." A new book, *John Shaw's Guide to Digital Nature Photography*, is scheduled for publication in early 2015. See more at www.johnshawphoto.com.

John Shaw

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DaVinci Resolve 11 now adds professional nonlinear editing to the world's most powerful color grading system!

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DaVinci Resolve's multi track timeline lets you quickly ripple, roll, slip, slide, extend and shorten edits. The context sensitive trim tool changes automatically based on the position of the mouse to make editing faster! Dynamic JKL trimming works on multiple tracks and can be done in the same direction or asymmetrically. Whether you use the mouse or keyboard, Resolve is easy to learn and has all of the tools professional editors need!

Scalable Power

Hollywood's leading studios choose DaVinci Resolve because it handles incredibly high resolution images and massive amounts of data easily on super tight deadlines. Resolve is scalable and works on laptop's up to massive multi GPU systems connected to shared storage. Whether you're working on HD, 4K or beyond, DaVinci Resolve has the power, performance and creative tools you need to get the job done!

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SHOWCASE

In The Channel

Matthew Meier is a professional underwater, nature and travel photographer living in San Diego. Formally trained at the Brooks Institute of Photography in Santa Barbara, Meier describes his affinity for California's Channel Islands: "The Channel Islands is where I got my start in underwater photography. It's where I learned about lighting, exposure and strobe positioning to craft beautiful photos in less than ideal conditions. The diversity of wildlife under water rivals any place in the world and includes small, colorful nudibranchs up to the largest creature on earth, the blue whale." See more at www.matthewmeierphoto.com.

Matthew Meier

Featured photo by **JON SECORD** www.jsecordphoto.com

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◀ CANON EOS 5DS/5DS R

Canon has developed the **EOS 5DS** and **5DS R** models, which offer the highest resolution of any 35mm DSLR, to date. Both the 5DS and 5DS R use a 50.6-megapixel, full-frame CMOS sensor and Dual DIGIC 6 processor, allowing quick 5 fps continuous shooting that captures full, sharp, detailed 50-megapixel resolution, and the 5DS R further maximizes sharpness with a cancelled low-pass filter. The cameras use 61-Point High-Density Reticular AF with 41 cross-type sensors and have a sensitivity of ISO 100-6400 (12,800 extended). The 5DS and 5DS R both have a built-in intervalometer, shoot 1080p full HD video and offer a creative Time Lapse Movie function, which automatically builds a time-lapse video from still images. While the cameras maintain the familiar 5D body, the chassis, baseplate and tripod lug have been reinforced for stability and to reduce camera shake. Go to outdoorphotographer.com/blog to learn more about the new EOS 5DS cameras and what they offer nature photographers. List Price: $3,699 (5DS); $3,899 (5DS R). **Contact:** Canon, www.usa.canon.com.

NIKKOR 300mm F/4E PF ED VR ▶

Nikon's travel-friendly **AF-S Nikkor 300mm ƒ/4E PF ED VR** lens is 30% shorter and 1.5 pounds lighter than its predecessor. This size and weight reduction is due, in large part, to Phase Fresnel optical technology that also contributes to a correction in chromatic aberration. The lens utilizes 4.5 stops of Vibration Reduction for sharp images when handheld, with additional VR modes for Sports & Action and Tripod Detection. Extra low dispersion glass has a Nano Crystal Coating to prevent ghosting and flare, as well as a fluorine coating to repel dust, water, grease and dirt. New electromagnetic aperture control adds precision to continuous shooting. Silent Wave Motor offers quiet AF operation, with quick manual override from a focus ring spin. List Price: $1,999. **Contact:** Nikon, www.nikonusa.com.

◀ SAMSUNG NX500

Samsung has taken the core technology of the NX1 and packaged it in a small size, producing the powerful, yet portable **NX500**. The 28-megapixel, backside-illumination APS-C sensor and DRIMeV processor provide quick high-quality stills and video. The BSI APS-C sensor supports 4K and UHD video recording with a built-in HEVC codec, which compresses file size to maximize storage space without harming quality. The DRIMeV processor produces accurate color reproduction with improved noise reduction, and when paired with the Hybrid AF system, results in 9 fps continuous shooting. The NX500 also includes Samsung Auto Shot, which uses motion detection to predict perfect timing for capturing an action shot. The 3-inch touch-screen display has tilt and flip functionality. The NX500 also supports built-in WiFi, Bluetooth and NFC capability. Estimated Street Price: $799. **Contact:** Samsung, www.samsung.com.

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ULTRAWIDE-ANGLE ZOOM ▶

Tamron continues to add to the company's unique line of lenses for full-frame cameras with the **SP 15-30mm ƒ/2.8 Di VC USD ultrawide-angle zoom**. The 18 optical lens elements in 13 groups include an eXpanded Glass Molded Aspherical element and several Molded-Glass Aspherical and Low Dispersion elements, preventing geometrical distortion and ensuring lateral color correction throughout the zoom range. Utilizing Vibration Compensation, the lens corrects for slight camera shake in low-light and slow shutter-speed situations. The Ultrasonic Silent Drive maintains quiet autofocus action with high torque and precision. The Broad-Band Anti-Reflection coating and Extended Bandwidth & Angular-Dependancy coatings reduce ghosting and flare, while the fluorine coating repels dirt and water. List Price: $1,199. **Contact:** Tamron, www.tamron-usa.com.

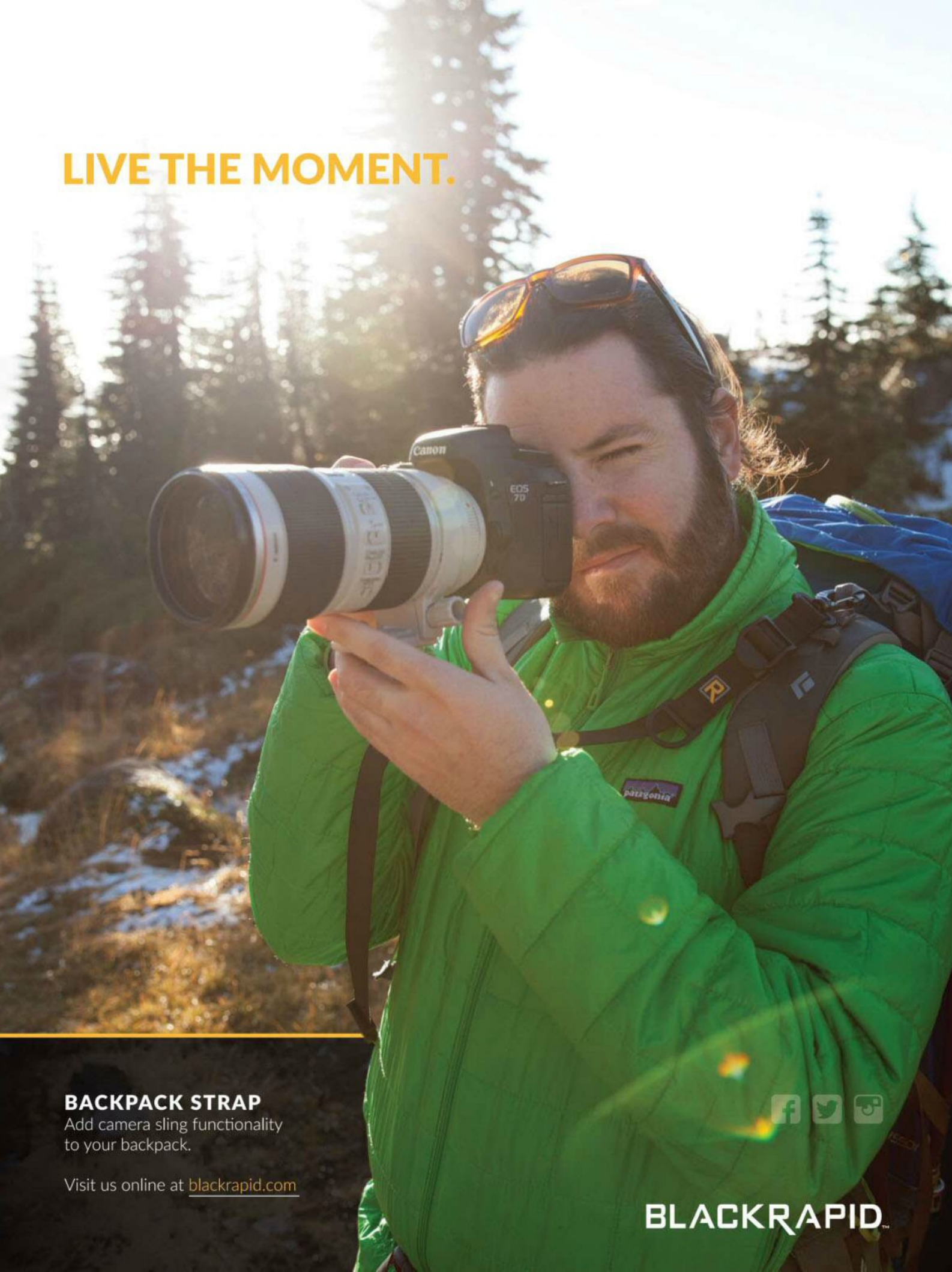
▲ PENTAX K-S2

Ricoh has introduced a small, lightweight and rugged **Pentax K-S2**, featuring a retractable standard zoom kit lens. The 20-megapixel CMOS sensor without an anti-aliasing filter, combined with the Prime MII image processing engine, minimizes noise at high sensitivity up to ISO 51,200. The SAFOX X AF sensor module provides precise and responsive autofocus with subject tracking and 5.5 fps continuous shooting. The in-body Shake Reduction system keeps images sharp while handholding with longer lenses, while the Clarity Enhancement mode captures uneven texture to produce a more true-to-life textural reproduction. The K-S2 captures 1080p full HD video and has built-in WiFi and NFC connection. The weather-resistant body is sealed to protect against rain and dust. A 3-inch, variable-angle LCD screen rotates 180°. The kit includes the new retractable standard zoom HD DA 18-55mm lens, which adds only 1.5 inches in height to the camera body when fully retracted, keeping the body profile slim. The lens has a 7-blade rounded aperture and multilayer HD coating. List Price: $799. **Contact:** Ricoh Imaging, www.ricohimaging.com.

◀ OFF-ROAD MONOPOD

Manfrotto has developed the new **Off Road Collection** designed to meet the needs of outdoor adventure photographers. In partnership with the Italian ski and trekking pole company Fizan, Manfrotto has created **Off Road Walking Sticks** with the ability to double as a convenient monopod. Weighing less than one pound for the pair, the walking sticks provide comfortable hand grips and wrist straps, with legs that close telescopically in three sections and that can be pulled apart for easy cleaning. One walking stick hand grip features a camera mount with quick wheel attachment, handling a 5.51-pound weight, covered by a protective cap when not in use. The feet have a spiked base and come with rubber covers and baskets for use in various terrain. Available in blue, green and red. List Price: $99. **Contact:** Manfrotto, www.manfrotto.us.

◀ More gear online: www.outdoorphotographer.com/infocus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◀ OM-D E-M5 MARK II

The new **OM-D E-M5 Mark II** by **Olympus** features a redesigned 16-megapixel, Live MOS Micro Four Thirds sensor combined with a TruePic VII Processor. The camera shoots with a 1/8000 mechanical shutter speed and a 1/16000 electronic shutter speed in Silent Mode. RAW files can be shot at up to 10 fps with S-AF and 5 fps with C-AF with tracking enabled. The 81-point Fast AF offers an expanded focus area, which the Small Target AF focuses on a small area across the entire frame. The 5-axis image stabilization provides 5 steps of compensation for sharp handheld shots as slow as a ¼ sec. shutter speed. A 40-megapixel High-Resolution Shot mode employs a pixel-shift technique using the voice-coil motor IS unit to capture 8 sequential images, moving the sensor 0.5-pixel steps between each shot, then commingling images (use of a tripod is recommended). Video mode captures 1080p up to a 60p frame rate and includes an external audio input, as well as a headphone jack for audio monitoring. Movie Teleconverter, time-code settings and an external HDMI monitor connection are also supported. The camera features a dustproof and splashproof body, and when paired with some M.ZUIKO DIGITAL lenses, can be used in the rain. The Supersonic Wave Filter uses high-frequency movement to remove dust and debris from the sensor. The E-M5 Mark II also features a 3-inch, 1.04-million-dot vari-angle touch screen and 2.36-million-dot electric viewfinder, plus WiFi capability. List Price: $1,099. **Contact:** Olympus, www.getolympus.com.

◀ 150-600mm SPORT LENS

Compatible with full-frame- and APS-C-sized sensors, **Sigma** has delivered a rugged **150-600mm *f*/5-6.3 DG OS HSM | Sport lens** ready to capture quick-moving wildlife. Using 2 FLD glass elements and 3 SLD glass elements, the lens maintains sharpness throughout the zoom range while controlling for chromatic aberration. Optical Stabilization features an accelerometer for improved horizontal and vertical panning. A zoom lock switch can lock on any focal length, and the optional manual override feature can be activated while in autofocus mode by rotating the focus ring. The body has a solid dustproof and splashproof construction. Compatible with the Sigma USB dock, the lens is available in Sigma, Canon and Nikon mounts. List Price: $1,999. **Contact:** Sigma, www.sigmaphoto.com.

VIDEO TRAVEL TRIPOD ▶

The **Aero Travel Tripod Kit for Video** by **Benro** is a versatile and compact option for shooters who are constantly on the go. The **Aero S2** supports up to 5.5 pounds and folds to a compact 18.3 inches, while the **Aero S4** supports up to 8.8 pounds and folds to 21.7 inches. The tripods utilize a reversible folding leg design to maximize a mobile travel profile. When extended, the legs have three locked leg positions. The removable leg and center column can be combined to create a monopod, when needed. The removable fluid head features 360° panning and smooth tilting, plus a bubble level. The Quick Release plate uses a safety lock. The S4 also features a removable handle for mounting on either side of the fluid head. The Aero Travel Tripods include quick flip leg locks, a weight hook and carrying case. List Price: $199 (Aero S2); $259 (Aero S4). **Contact:** Benro, www.benrousa.com.

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RUGGED RAID HARD DRIVE ▸

Continually meeting the needs of the traveling photographer, **LaCie** has packed increased speed, capacity and safety into the company's mobile and durable packaging with the **Rugged RAID hard drive**. The two internal hard drives have a combined 4 TB capacity (equivalent to 60 64 GB memory cards), reducing the number of drives you need to pack. When used in the preconfigured RAID 0 mode, speeds reach up to 240 MB/s. The drive can also be switched to RAID 1 mode for built-in safety. Powered through the integrated Thunderbolt cable, there's no need for an external power source, and the additional USB 3.0 connection ensures usage with OSX and Windows computers. The drive is dustproof and splashproof, even during operation, and can withstand drops of up to 5 feet and 1 ton of pressure. LaCie Private-Public software allows for full-drive password protection or protection of certain volumes with AES 256-bit encryption. List Price: $449. **Contact:** LaCie, www.lacie.com.

◂ TRIPLE THE TRANSFERS

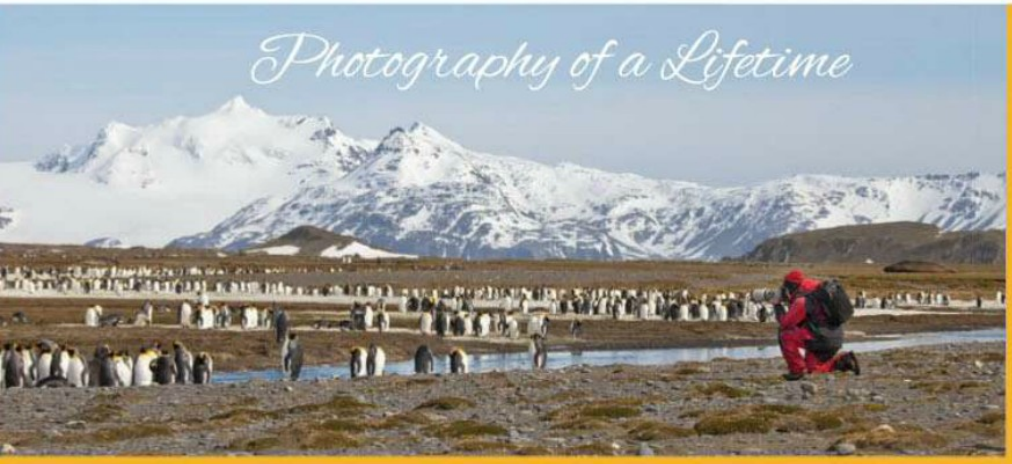
After getting back from an adventure shoot using multiple action cams with high-quality video footage, the time spent downloading files before you can start viewing and editing may seem torturous. Luckily, **Lexar** has introduced the **Professional Workflow UR1**, a three-slot microSD UHS-I USB 3.0 reader that quickly transfers 4K video files from three cards at once. The UR1 reader is compatible with both the Professional Workflow HR1 and HR2 reader and storage hub systems for easy download directly to external drives or to use multiple UR1 readers to download footage from up to 12 microSD cards at once. List Price: $39. **Contact:** Lexar, www.lexar.com.

PARALLAX BACKPACK ▸

The **Parallax Camera Backpack** by **Mountainsmith** has proven itself a reliable full-kit bag for photographers such as Andy Mann when he's on expedition for *National Geographic*. The padded back panel has a center airway to provide cooling while hiking. The back panel also unzips for access to equipment organized with customized dividers. The top of the bag has additional access to equipment. A side panel reveals access to a DSLR case that can be removed from the bag and front-mounted to the chest harness. Two front organizer pockets are joined by an additional pocket that has two separate sleeves for a laptop up to 17 inches and a tablet. A side-panel pocket with zip-out bottom can be used to carry a tripod and lightweight stand while still allowing access to equipment. The padded waist belt, side compression straps and dual-density shoulder straps with load-lifter suspension make it easier to tote a large kit. The Parallax includes a rain cover. List Price: $269. **Contact:** Mountainsmith, www.mountainsmith.com

CAMERA HOLSTER ▶

The **SpiderPro Camera Holster system** has been developed to provide comfort and safety for photographers who tote pro DSLRs for full days of shooting. The patented ball-joint system keeps your camera secure at your side while still allowing for movement. The lens points back while the flash runs parallel to your hip so you can stand, squat and move freely without worrying about damaged equipment. Available in a single-camera or dual-camera system. List Price: $135 (single-camera system); $235 (dual-camera system). **Contact:** Shai Gear LLC, www.spiderholster.com.



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◂ LUMIX GF7

Panasonic has announced the **LUMIX DMC-GF7**, which features a 16-megapixel Digital Live MOS sensor and Venus Engine, producing sensitivity up to ISO 25,600. The 3.0-inch, 1040-dot LCD rear monitor is touch-screen-sensitive and can be flipped up 180° for Self Shot Mode. The Contrast AF system provides a burst rate of approximately 5.8 fps, plus 40 fps using an electronic shutter. The GF7 shoots 1080p full HD video in AVCHD progressive and MP4 with stereo sound. Full-time AF and Tracking AF can be used, or employing the touch screen with Touch AF, offers the look of rack focus. WiFi connectivity is available in conjunction with a smartphone or tablet. Using the Panasonic app, the smart device can be used as a multi-capable remote shutter with monitor or set up with the instant transfer mode to send photos directly to the device as they're shot. Estimated Street Price: $599. **Contact:** Panasonic, shop.panasonic.com.

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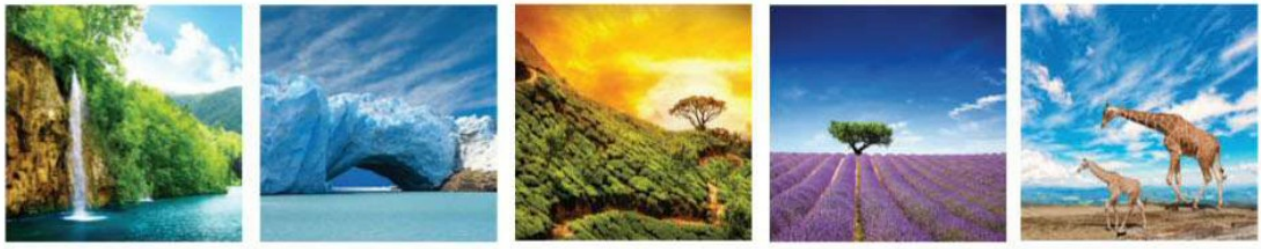

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◂ DAVINCI RESOLVE UPDATE

Blackmagic Design has improved CinemaDNG RAW image processing and workflow with Avid editors with the **DaVinci Resolve 11.2 software update**. The free download update has updated the CinemaDNG tone curve and soft clip option for improved colors and realistic detail when converting to a reduced color space. New DNxHR encoding and decoding support allows for a fluid workflow with Avid editors by allowing high-resolution media and sequences to move between systems, and AAF import with timeline resolution gives accurate round-trip support with Media Composer 8.3. Additional features include flag and marker support in ColorTrace and support for Red SDK 5.3.
Contact: Blackmagic Design, www.blackmagicdesign.com.

Power When You Need It

The PowerPal provides photographers with backup power for recharging DSLR camera batteries and other 5V USB-charged devices in all situations where an AC power source is not available. It is a great tool for photographers on the move and working in remote environments.

- Recharge the camera battery where an AC power source is not available.
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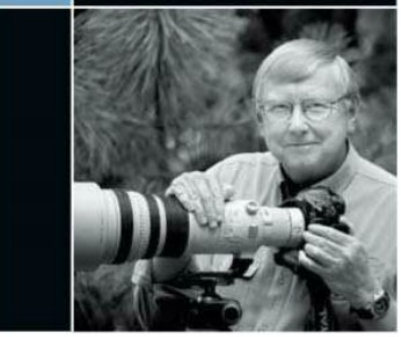

The Look Of Spring

The Halo Effect • Steps For Stacking • Music For Slideshows And Video • Overexposure: An Editorial

[By George D. Lepp With Kathryn Vincent Lepp]

Two exposures on the same frame, one sharp, one out of focus, give a tender, soft look—a halo effect—to these hollyhock blossoms. Canon EOS 5D Mark III, 100-400mm zoom at 400mm, 1/500 sec. at f/8, ISO 400

A montage of roses created with nine exposures on a single frame; for each capture, the handheld camera was repositioned within the composition. Canon EOS 5D Mark III, 180mm macro, 1/80 sec. at f/8, ISO 400

The Halo Effect

If you're looking for a new approach to spring flower photography, you could try adding a soft "halo" to the blossoms for a whimsical or moody appearance. You can achieve this effect at capture or in postprocessing on the computer.

Many current DSLRs have the capability of capturing multiple exposures on a single frame. Several of my Canon cameras can accomplish up to nine exposures per frame, but I usually take only two for the halo effect. You'll need to work from a tripod. Once you've composed your image and programmed the camera to take multiple exposures on the same frame, capture the first image with the camera nicely focused to give a sharp image. For the second capture, throw the subject considerably out of focus. Usually, it works best to achieve the out-of-focus capture by placing the area of focus in the space in front of the subject rather than behind it. You don't want the background, or any other part of the second image, to be in focus; you want it all out of focus. Look at the result on the LCD screen. You have

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several ways to modify what you see if that result isn't to your liking. You can adjust the range of focus for the second image to either increase or decrease the "out-of-focus" capture. Or you can change the exposure for either the sharp or unsharp image to emphasize either one. Pixels are cheap, so experiment! The beauty is that you can see the result and make adjustments immediately. From here, your imagination should be working. You might try setting the

camera for more than two exposures on the frame to capture the same or different flowers in a montage. If your camera doesn't have the multiple-exposure feature, take two identically framed sequential images, one sharp and another out of focus, and combine them with a Blend mode in the computer.

You can achieve the multiple-exposure effect with a single capture in imaging software. In Photoshop, make a new background copy layer of the subject and then apply a filter blur (Gaussian Blur) of about a 25-pixel Radius. Reduce the opacity of the upper (blurred) layer to about 50%, and you'll have a sharp subject with a beautiful soft look. The result is similar, but not exactly the same, as the effect achieved

with multiple captures; experiment with the amount of blur and opacity for different results.

This technique works nicely on portraits—of humans and animals—as well.

Steps For Stacking

Q *I've downloaded Zerene Stacker and discovered that the program works only with TIFFs or JPEGs. How do you incorporate RAW images into your Zerene Stacker workflow? Do you have to process the series of RAW files first and convert to TIFF before stacking? Or do you shoot only JPEGs when you plan to stack a series of images with different points of focus?*

L. Rankin
Via email

A When I'm capturing stacked images, I usually work in RAW format. Before compositing the images, I bring them into Adobe Raw Converter or Adobe Lightroom to optimize them; then I save the optimized images as 16-bit TIFFs. At that point, they're ready for compositing in Zerene Stacker or any other stacking software.

You don't have to convert the RAW files before stacking in Adobe Photoshop or Helicon Focus because these programs make the conversion as part of their processing sequence. Even so, it makes sense to apply precisely the same optimization processing to each file prior to stacking, and saving them in a different file format preserves your original RAW captures in case you want to come back to them later. Once the stacking is completed, I bring the final image into Photoshop to make any necessary improvements to it.

That said, when I'm working on extremely large projects, I capture in the largest JPEG file to keep file sizes from getting out of hand, then follow the same workflow. I just finished a macro panorama with 80 stacked positions comprised of more than 1,400 captures. Even with the JPEG capture, the final image size was 2.1 GB in an 8-bit file.

Music For Slideshows And Video

Q *I'm finishing up a slideshow, and I also like doing time-lapse videos that are always better with music. Where can I find music to accompany these programs, and what are the requirements for copyright so I don't get in trouble for infringement?*

J. Andersen
Asked at a seminar

A As photographers, we should respect everyone's intellectual property. Even if you're only showing your slide/music programs to the folks at the camera club or senior center, you should be working with licensed music. And, if you want to place your work on social media such as YouTube, you'll need to be sure you're not violating any copyrights.

For the last couple of years, I've been working with a company called SmartSound and their software Sonicfire. Not only does the company maintain an excellent library of diverse music for use with movies, slideshows or time-lapse sequences, their technology allows the photographer to instantly match the length of the song to the video. You can also change the

mix of the instruments making up the piece and then make variations on the music's arrangement. All of this sounds complicated, but it really isn't. After going through the online tutorials, I can easily work with music that no one else would recognize and that specifically fits the content.

SmartSound's software and music albums aren't free, but if you're trying to do quality work that doesn't sound like everyone else's, this is the way to go. And all the music comes with a certification that it's 100% copyright clear. That means a lot to me.

Overexposure: An Editorial

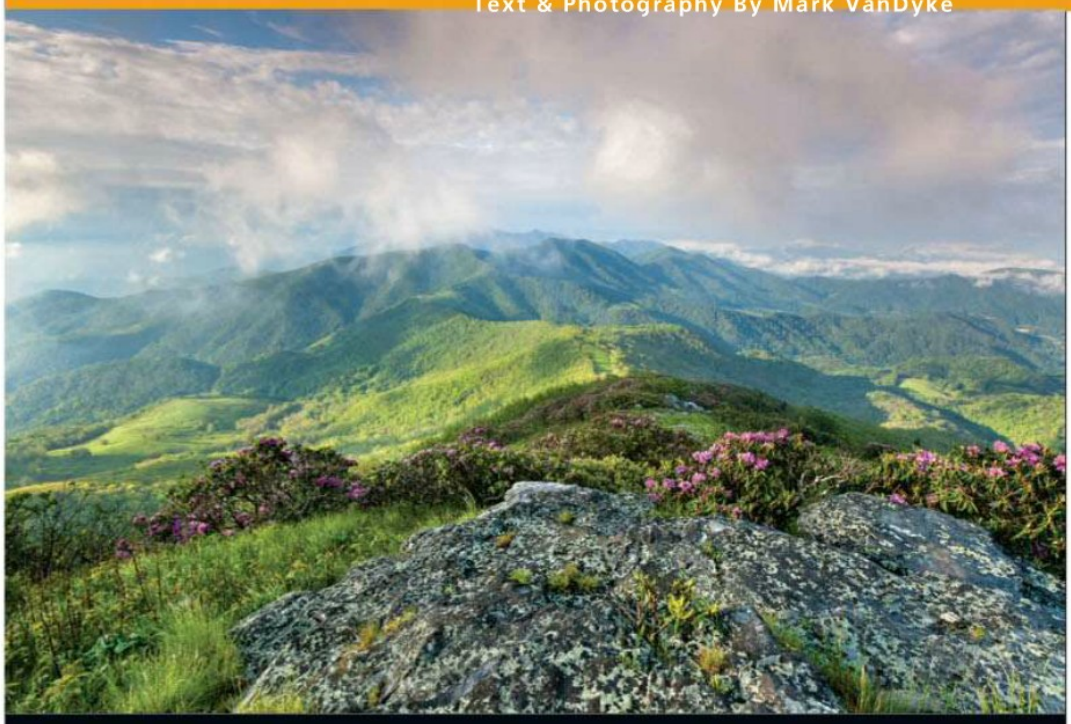
At seminars around the country, we've received a lot of feedback to our discussion of "art vs. state of the art" that appeared in this space last July. (See "In The Eye Of The Beholder," www.outdoorphotographer.com/columns/tech-tips/in-the-eye-of-the-beholder.html#.VOEAbkKRP8s.) Essentially, we suggested that skilled photographers, in a photographic world with virtually no technical limitations, will find that modern tools and techniques expand their opportunities to express creative visions in ways that engage viewers.

There's a growing backlash against technically precise photography, however, especially as it applies to the genre of landscape. For the purposes of this discussion, we'll define "technically precise" as photography that's beautifully composed, captured in the most advantageous light, saturated, with good tonality and deliberately placed detail. Some commentators lament the "soullessness" of the gorgeous landscapes, captured from exotic locations and postprocessed to stunning perfection, that now permeate social media, television and galleries, both physical and virtual. If a photographer is paying that much attention to light, color, dramatic message and pursuit of accolades and/or sales, they ask, where do the intangibles of inspiration, vision, message and creativity come into the mix? Is all that perfection getting to be just plain boring?

While there's no doubt that beautiful landscape photography is everywhere, I've spent enough time with other photographers to know I'm not the only one who feels the excitement and fulfillment that comes with discovering and capturing a place in your own way and in mastering new techniques that expand your creative interpretation. It's easy to say that it's all been done; just Google "images of Iceland" or "images of Patagonia." And, for some, a response to the overwhelming abundance of magnificent "modern" landscapes is to go retro, pick up the old film camera, shoot in black-and-white and create in the darkroom. That's okay, too. The old adage "*f*/8 and be there" might now be revised to "iPhone and be there" because it really is about the journey, the place, the experience and the story you share with your photography. The viewer's response doesn't really matter; it's what the photographer sees, feels, learns, conveys and remembers that counts now, more than ever, in an overexposed world. **OP**

*See **George Lepp**'s website for upcoming workshops and seminars at www.GeorgeLeppImages.com.*

Text & Photography By Mark VanDyke



GRASSY RIDGE BALD

Roan Highlands, North Carolina

Location

Grassy Ridge Bald is situated within the Roan-Unaka Mountain Range along the state borders of western North Carolina and eastern Tennessee. While cabins and organized campground accommodations can be found at Roan Mountain State Park at the base of the mountain along TN-143, backcountry camping is allowed on the balds themselves, making sunrise and sunset more manageable experiences.

Weather

Due to the high elevations found in the Roan Highlands and the generally treeless slopes of its peaks, extreme weather is frequent and should be respected. Winter snow, ice and extreme wind chills create conditions more characteristic of Northern climates. The cooler temperatures characteristic of the Roan Highlands are a major draw during the Southern summer months; however, fast-moving thunderstorms can sweep the balds and change weather conditions quickly. Extra layers and rain gear are a must for any trip up to the balds.

Photo Experience

A wide-angle zoom is my go-to for the Roan Highlands, allowing the frame to mimic and capture the expansive, open landscapes that can be found atop the grassy balds. Strong foreground elements abound at ground level, from blooming wildflowers to weather-aged rock formations to long, windswept grasses. Exceptional background peak and valley landscapes fade into the horizon in all directions, making choices behind the lens both exciting and abundant. If shooting wide during morning or evening light, consider bringing along a graduated neutral-density filter to even out overall exposure values and retain details. Distant landmarks, such as Mount Mitchell and the Black Mountains to the south or Grandfather Mountain and the Linville Gorge Wilderness Area to the north and east, can be isolated through the use of a telephoto lens, amplifying the frequent weather dramas of fog and light that can occur during the magic hours. For my personal tastes, nothing beats a sunrise from the spine of Grassy Ridge Bald, where expansive views exist to the east and west, with the ridgeline running generally north-south. For sunset, it's hard to beat the classic view of Engine Gap and Round Bald from high atop Jane Bald on the Appalachian Trail. If you're considering shooting during sunup or sundown, bring a tripod, as well as a flashlight or headlamp for safe travel along the trails during the dark hours.

Best Times

The Roan Highlands are spectacular year-round. Winter provides solitude and extreme conditions, with stunning seasonal landscapes for the bold willing to brave the weather. Spring sweeps in with showy ground flowers, and autumn turns the abundant blueberry bushes to a blazing red. For me, nothing beats the show that the Roan Highlands put on in mid-June. Wild Catawba rhododendron bloom in profusion along the balds, turning the mountainsides bright pink and magenta with their colorful blooms. Flame azalea provide accents of blazing orange and yellow, especially along the Engine Gap stretch of the Appalachian Trail. If you're lucky, the showy and endangered Gray's lily will make an appearance closer to the ground for those who are attentive. Fog, as well as strong thunderstorms, can frequent the area in June, bringing dramatic environmental conditions to augment the colorful landscapes. The result: one of my favorite places, behind the camera or not. OP

Contact: North Carolina Tourism, visitnc.com. See more of Mark VanDyke's photography at markvandyke.net.

Essential Gear...

When tackling an unfamiliar location in the dark for sunrise or sunset photography, nothing beats the added safety a **headlamp** can provide. It supplies hands-free light while setting up gear and adjusting camera settings, can be used for light-painting and allows you to safely navigate the trails upon arrival and departure, making it a necessary addition to a photographer's bag.

Contact: Petzl, www.petzl.com.

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ASSIGNMENTS

▸▸ Winning Images From The Weekly Assignments At outdoorphotographer.com

This month, we feature Assignments that look not just at the beauty of a location, but that rely on the skills of the photographers to tell a story through shape, form and defining moments for themselves and their subjects. Congratulations to Wendy Gedack, Nico DeBarmore, Erika Skogg and Vincent Bonafede for their winning submissions. To get your photos in the running, all you need to do is submit them to the weekly Assignment on **outdoorphotographer.com**.

1) Winter Shapes Assignment Winner
PHOTOGRAPHER: Wendy Gedack
EQUIPMENT: Canon EOS 6D, Canon EF 24-105mm ƒ/4L IS USM, tripod
When preparing for this journey, I diligently monitored the weather, trying to predict the ideal morning to experience Mesa Arch in Canyonlands National Park, Utah. Originally, I had planned to visit the arch a day earlier, on January 1 of this year, but altered my itinerary last minute due to the changing forecast, which predicted snow and clouds for most of the morning. Given my short timeline in the area, I hoped for the best. Driving to this site well before sunrise, I could tell the weather was going to be unpredictable due to a low layer of fog on the horizon. It was a bitter cold morning, with temperatures hovering around 9°. Hiking in the dark with only my headlamp to guide my way created a sense of excitement and anticipation of the view ahead. As I approached the site, I secured my spot between two other photographers. The bank of clouds on the horizon threatened to cover the sun as it rose, but the potential was there; I just had to be patient. It wasn't until the sun crested the low layer of clouds and fog that I knew I had chosen the right morning. The lighting continued to change as the heat from the sun caused the fog to flow into the valley, creating an amazing atmosphere. It was a morning I'll never forget—truly unpredictable beauty. The magnificence and drama that unfolded that morning are what draw me to explore and photograph landscapes each and every day.

2) Winter Shadows Assignment Winner
PHOTOGRAPHER: Nico DeBarmore
EQUIPMENT: Canon EOS 5D Mark II, Canon EF 70-200mm ƒ/2.8L IS, tripod, remote release
On a January 2015 trip to Grand Teton National Park, I awoke to find the snowstorm from the previous night had dissipated, revealing the beautiful Tetons surrounded by pines and cottonwoods freshly laden with snow. I drove to the Snake River Overlook, as I had previsualized a predawn alpenglow image of the Tetons in a pink light with the Snake River winding through woodlands covered in fresh snow. The alpenglow and sunrise light were only so-so that morning, and I left the Snake River Overlook feeling unsatisfied. That's when I saw the sun, now higher in the sky, backlighting everything in the Antelope Flats. The normally plain and featureless foreground of a snowy field was striking and far from boring—it was broken and dappled by the long dramatic shadows cast by those same glowing cottonwoods. I chose a telephoto lens at 85mm for this landscape to provide a perspective that would compress the distant trees in with the closer ones and still capture the dramatic shadows in the foreground. Photographing this panorama was challenging, as the sun was barely filtered by the trees and would, at times, cast unavoidable flare onto the image. In postprocessing, I converted the image to black-and-white; I felt the blue sky and bluish snow in the foreground were nice, but I really wanted to emphasize the form of the shadows, the trees casting them and the glowing sun illuminating the frosted branches.

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3) Bird In Context Assignment Winner
PHOTOGRAPHER: Erika Skogg
EQUIPMENT: Canon EOS 7D, Canon EF 100-400mm ƒ/4-5.6L IS
I took this photo the summer of 2014 in Tanzania in the Ngorongoro Conservation Area. I had been watching these cranes begin to jump and dance around each other, so I held the shutter to get multiple shots, hoping to catch them in a unique position. When I reviewed the sequence, I chose this photograph of them beak to beak, creating an almost mirrored image of one another.

4) Tell Me A Story Assignment Winner
PHOTOGRAPHER: Vincent Bonafede
EQUIPMENT: Canon EOS Rebel T2i, Canon EF 28-135mm ƒ/3.5-5.6 IS USM, B+W circular polarizer, Manfrotto carbon-fiber tripod
On February 22, 2012, I captured my first Horsetail Fall when I was 12 years old. My dad had planned a trip to Yosemite National Park during the week because of the weather. I tried to persuade my mom to let me miss part of the school day, but it was a no-go. I went to school like usual that day and was pretty bummed. Just after lunch, I got called down to the office and was surprised to see my dad. He said he was taking me out of school early to go to Yosemite; my mom had changed her mind. I was so excited! I knew we'd get back late, so I did my homework on the way to the park. When we arrived, there were many photographers all looking for the best location. We found a spot and set up our cameras. I was a little nervous because I didn't know what to expect. The waterfall seemed to have enough water and the sky was clear, all things that were needed for the event to happen. At that moment, I had found a passion for photography. This is a single image edited in Lightroom and CS6. I used Nik Viveza to edit the shadows and highlights.

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THE WILD, WI

How Sandy Sisti followed her dream to Yellowstone to become a full-

When Sandy Sisti first set foot in Yellowstone National Park, it was nothing short of a revelation. The lifelong animal lover and hobbyist photographer felt as if she was finally home. But, in fact, her home was 2,000 miles away. The career pharmaceutical executive surely wasn't going to leave New York to move to Wyoming, so she did the next best thing: She moved to Montana.

"The first time I went to Yellowstone was 1994," Sisti says, "and, like, all these hearts started popping out of my head. I thought, 'My God, this is the greatest place in the world.' I started trying to find a pharmaceutical job near Yellowstone—as if there are a lot of pharmaceutical companies near Yellowstone."

Sisti and her husband found jobs in Montana. It looked nearby on a map, she says, but it was still a five-hour drive to the park. So, after five years of occasional trips to Yellowstone, they transferred to Cody, Wyoming, only an hour away.

Content to photograph wildlife on the weekends, in 2011, Sisti found herself unexpectedly out of a job. Instead of moving back East, she and her husband decided to stay in Wyoming and make a go of a career in wildlife photography.

"After working in the pharmaceutical industry for so many years," says Sisti, "I was kind of lost. You know, when you lose your job, you feel kind of small, and you feel really bad about yourself and wonder 'What did I do wrong?' But, you know, if it wasn't for Yellowstone, if it wasn't for me going to the park every day, I don't know what I would have done. It was very therapeutic. I started feeling less and less bad, and now I'm, like, whoopty doo, they canned me!

"It's so different," Sisti adds, "and it took some getting used to because I'm

LD WEST

time wildlife photographer

BY WILLIAM SAWALICH | PHOTOGRAPHY BY SANDY SISTI

used to getting up and going to work for all these years. But it's great. I always wanted to do it, but it was just sort of like a dream, not something you're really going to do. I always thought, 'I can't really make any money doing this; I'd better do it as a hobby.' But then it turned into my job. I couldn't be happier doing what I do now. Believe me, going out and looking for grizzly bears is a lot more fun than dealing with the FDA."

Sisti treats looking for grizzly bears—and photography, in general—as if it's a regular job. She's up early to head out at least five days a week.

"I get up and go to work," she says. "And sometimes I don't feel like it, but I always find that it's the days that I don't feel like it that I see something. Just like any job, you go because you have to, and sometimes you're tired or you don't feel like it, but that's the day you see something. So I try to get out there as much as I can."

In the warm weather months, Sisti is just a 20-minute drive from the eastern entrance to Yellowstone, which is closed from November to May. But her home in Wapiti, Wyoming, is also nestled between the North Fork of the Shoshone River and the Shoshone National Forest. And the stretch of land between Wapiti and Yellowstone, she says, is the most dense grizzly territory in the Lower 48. She doesn't have to travel far to find wildlife. Still, there's no guarantee the animals will be where she hopes to find them. Such is the plight of the wildlife photographer.

"You always have the scenic spots in the same place," she says, "but the animals, you never know where they're going to be. Ninety percent of the time, I don't see anything. You might have an idea of what you want to take a picture

of, but the animal has to be there and the light has to be nice. And, most of the time, that doesn't happen. So, when it does happen, it's really exciting.

Adds Sisti, "Certain times of year, if you've done it long enough, you start knowing, 'Okay, I'm going to start seeing moose over here, and now the grizzly bears are going to be out. And now it's the elk rut or the bison rut, and these little pygmy owls are going to be mating on the North Fork.' And even though you look for them and it's the right time of year, lots of times, you still don't see anything. Spring, you have more opportunity to view more animals. Fall and winter, you have more opportunity to see wolves. I didn't see that many this year because there wasn't that much snow to push the elk down. I saw tracks, but I wasn't finding them like I would if we had a lot of snow. It was a little quiet, a lot of walking around on snowshoes looking for stuff and scratching my head."

Winter weather has a real effect on the photographer's productivity, both good and bad. Last Christmas, while visiting Grand Teton National Park, Sisti made an image of a pair of elk bracing themselves against a winter storm.

"We went to see some friends over Christmas," she says, "and there really wasn't any snow. And Christmas Day, not only did we get the snow, we got the wind. Wyoming is, like, the wind capital of America. The winds here will blow you over, and it was one of those days. Sometimes, those stormy weather conditions make for interesting photography, but I always feel for the animals. I could go in the car and warm my hands in front of the heater, but they have to stay out there in that. Sometimes it's -30º or -40º. It wasn't that cold that day, probably 10º, but the wind was going 50 or 60 miles an hour. I guess the animals are used to it, but it's hard to see them out there. You wish you could do something to help them, but you really can't. This

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OPENING SPREAD: A bison herd in Yellowstone National Park's Hayden Valley, Wyoming. THIS PAGE, FAR LEFT AND LEFT: A bull moose in the Snake River, Grand Teton National Park, Wyoming; A northern pygmy owl in Wyoming's Shoshone National Forest. THIS PAGE, BELOW LEFT AND RIGHT: A bull bison, Yellowstone National Park, Wyoming; A subadult grizzly and a coyote, Yellowstone National Park, Wyoming.

year, we haven't had much snow, which is great for the animals because it's not as difficult for them. It's not as good for the photographers, but that's okay with me. I'd rather it be easy on the animals."

It's clear Sisti really feels for her subjects. She adores them, and she works hard to treat them with the respect they deserve—for the benefit of the photographer, as well as the wildlife.

"You have to always make sure you give the animals space," she says, "and you never want to approach them. When I first moved out here, I was very flip about bison, 'Oh, they're like cows'—until I saw them in the rut, and it was the scariest thing and the coolest thing

LEFT: Gray wolf siblings squabble over an elk carcass, Yellowstone National Park, Wyoming. BELOW: Bighorn rams, Shoshone National Forest, Wyoming.

Sandy Sisti's Gear

Canon EOS 5D Mark III
Canon EOS 7D
Canon EF 70-200mm ƒ/2.8L IS II
Canon EF 100-400mm ƒ/4.5-5.6L IS II
Canon EF 600mm ƒ/4L IS

"I have to say, I do use the 600mm a lot," says Sisti, "especially with animals like bears, because you don't want to get too close. And I do shoot out of the car a lot with a beanbag or another support. A lot of times, in the morning, if it's just me and a bear, I'm not going to stand outside. It's just a bad idea. I just got the new Canon 100-400mm lens, which is a really nice lens. I use a teleconverter sometimes; with a tripod, I'll use the 1.4x with the 600mm, but I don't do it with the zoom lenses. I also really like the 70-200mm zoom, and I've photographed bears with that if they're right outside the window—but that doesn't happen too often. My go-to lenses are the 100-400mm and 600mm."

I've ever seen in my life. Even an animal that you think is benign, you never know, he might have had a bad day, they might have just encountered another animal that annoyed them. So even an animal that isn't a bear or a bison or a big bull moose, you can't get really close because you don't know what's going on in their head. And it really isn't ethical to get right on top of them."

In the image called "Surveying His Kingdom," Sisti was photographing a group of bison from a distance when a moody bull walked loudly into frame.

"That's my favorite," she says. "That was shot in July, right before the bison rut really started. It really was kind of a fluke. Those bison that are far away in Elm Creek, I was taking pictures of them with my 600mm. The light was pretty, and there were some cows and calves, and they were running around. Bison in the rut make this really loud sound, and from far away I heard a big bull coming my way. Now that I've been in Yellowstone for a while, I love bull bison and I think they're my favorite subject to photograph, but they're scarier to me than bears. They're very ill-tempered; you don't want to get near them. So I got into the car and I took my 600mm and I kept taking pictures with my beanbag of the bison that were far away. And this bull came down the road, and I thought, "Oh, look at that, that's kind of a nice picture." I think I used a wide-angle, a 17-40mm, and I took a few shots of him before he started to give me the stink eye. In that picture, I'm starting to get the look: You better close that window, lady, and get out of here. I feel kind of bad that I shot it out of the car window, but you just can't stand that close to them. I got maybe 10 shots and then you could see his tail going up, he was mad, so I got out of there. That one really is my favorite."

Sisti has a lot of favorites. Like when she's able to observe particular animal behaviors or experience animals interacting. She once spent eight hours watch-

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- Early entry: $4.95 per photo. Must be postmarked or uploaded no later than **April 13, 2015**.
- Final entry: $5.95 per photo. Must be postmarked or uploaded no later than **May 18, 2015**.
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- Subject matter is open.
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Staying Safe In Grizzly Territory

Sandy Sisti says the grizzlies are so thick near her home that she prefers to avoid known bear hangouts. But because she may encounter bears anywhere she goes, she does a couple of things to stay safe.

"You always carry your bear spray out here," Sisti says. "Not that that's going to be the end-all, be-all, but carry bear spray all the time. We're in grizzly country. This area where I live, it's so thick with grizzly bears, I don't hike here. Not that I don't love grizzly bears; I've seen them on a trail from a distance, but I don't want to trip over a grizzly bear. They're my favorites, and I love them, but the feeling isn't mutual. They don't want to see me.

"You can wander upon a grizzly anywhere around here," adds Sisti. "I try to make noise when I hike, which is contrary to photography, but sometimes it's not about photography, it's about hiking and being safe. I'm not going to go out into the backcountry and quietly look for grizzly bears. I don't feel comfortable doing that. If something happens to me, then more than likely that bear is going to get shot. And I don't want that to happen. So if I'm going to go hiking, I'm going to make noise and make sure that whatever bear is there is going to hear my New York accent coming along the trail and is going to get out of there."

Sisti says the biggest thing photographers can do to stay safe in bear country is to stay alert, even when they're focused on a shot. It's a mental lapse that she has made, and it led to a close encounter.

"I was so stupid," she says. "Sometimes, you're just not thinking. It was early in the morning and I was driving into Yellowstone. I go in when it's dark so you can get there when the sun is coming up. It was a pretty spot and a pretty sunrise with nice color, so I pulled over. So I'm setting up my tripod and an elk cow runs by. She looks a little concerned, and it's early in the morning, and I'm thinking, 'Oh, gee, I wonder what could have bothered that elk cow.' I'm not really thinking. I'm setting up on one side of the street and I hear something behind me and I turn and there's a grizzly bear. And it's not light out, it's still dim, and the bear is really busy eating and digging. And I'm thinking, "Oh, my God, my car is all the way down there." I wasn't really sure what to do. I had my bear spray, but when you're out there and it's just you and a bear, it's kind of scary. My legs were starting to shake. What do I do?

"So, of course, I left my camera stuff there because, at that point, who cares. I just started backing toward my car; it was far enough away that I was afraid. I remember feeling like I was glued to the ground. My legs were like lead; they didn't want to move. The bear wasn't paying attention, but I know you're not supposed to sneak up on bears because they don't like it. So, I thought, 'Well, I'll say something." So I said, 'Hey, bear.' I choked it out, and the bear got frightened and backed up a little bit. You're not supposed to make eye contact, so I was sort of looking the other way. And he went back to digging, and I thought, 'Okay, I guess he knows I'm here," so I just backed up to the car, but, boy, were my legs shaking. The bear could care less. He saw me, I didn't see him. I think my voice made him jump a little and then he just went back to eating. He had plenty to eat; he wasn't interested in some skinny lady standing there on the side of the road. It was just the idiot me that didn't know that when an elk runs by and looks alarmed, you should think, 'Maybe I should get back to the car.'"

ing a pair of wolf siblings fighting over an elk carcass. But her all-time favorite moment was an interspecies interaction.

"It was one of the coolest things I've ever seen," she says. "It's a whole series of pictures of this young, subadult grizzly interacting with a coyote. Young grizzlies are really kind of playful, and he probably didn't mean any harm to this coyote. The coyote had a den nearby and was trying to lead the bear away from the den. The coyote would nip at the bear, but the bear was all playful, like a dog, rolling on his back. But the coyote didn't want to play. He was biting at the bear. I really do think the bear was playful. He could kill the coyote if he wanted to, but he was doing a lot of play-posturing, like when dogs play. Eventually, after an hour and a half, they disappeared over the ridge and they were gone. I had never seen anything like that before. To see two species interact—I'm lucky to see two coyotes interact, but to see a bear and a coyote interact—it was an amazing, amazing day."

Sisti has been shooting in Yellowstone almost daily for four years, but she still gets excited every time she sees an animal. Whether it's a bear or a bison, an elk or an owl, it's as if the Long Islander in her remains fully aware of just how special each encounter is.

"It's still really super-exciting," she says. "Anytime I see a bear, my heart goes really fast and my hands start shaking. I never really get over how excited I am to see them. Landscapes are beautiful and wonderful, but I don't feel the same way when I see a beautiful landscape as I do when I see an animal.

"Most days are quiet," she adds. "Most days I don't see a coyote and a bear interacting. Or I don't see the wolves fighting. Or a bison doesn't stand there looking out over the valley. That happens maybe once every thousand times. But that's still a better day than meeting with the FDA." **OP**

*See more of **Sandy Sisti**'s photography at wildatheartimages.com.*

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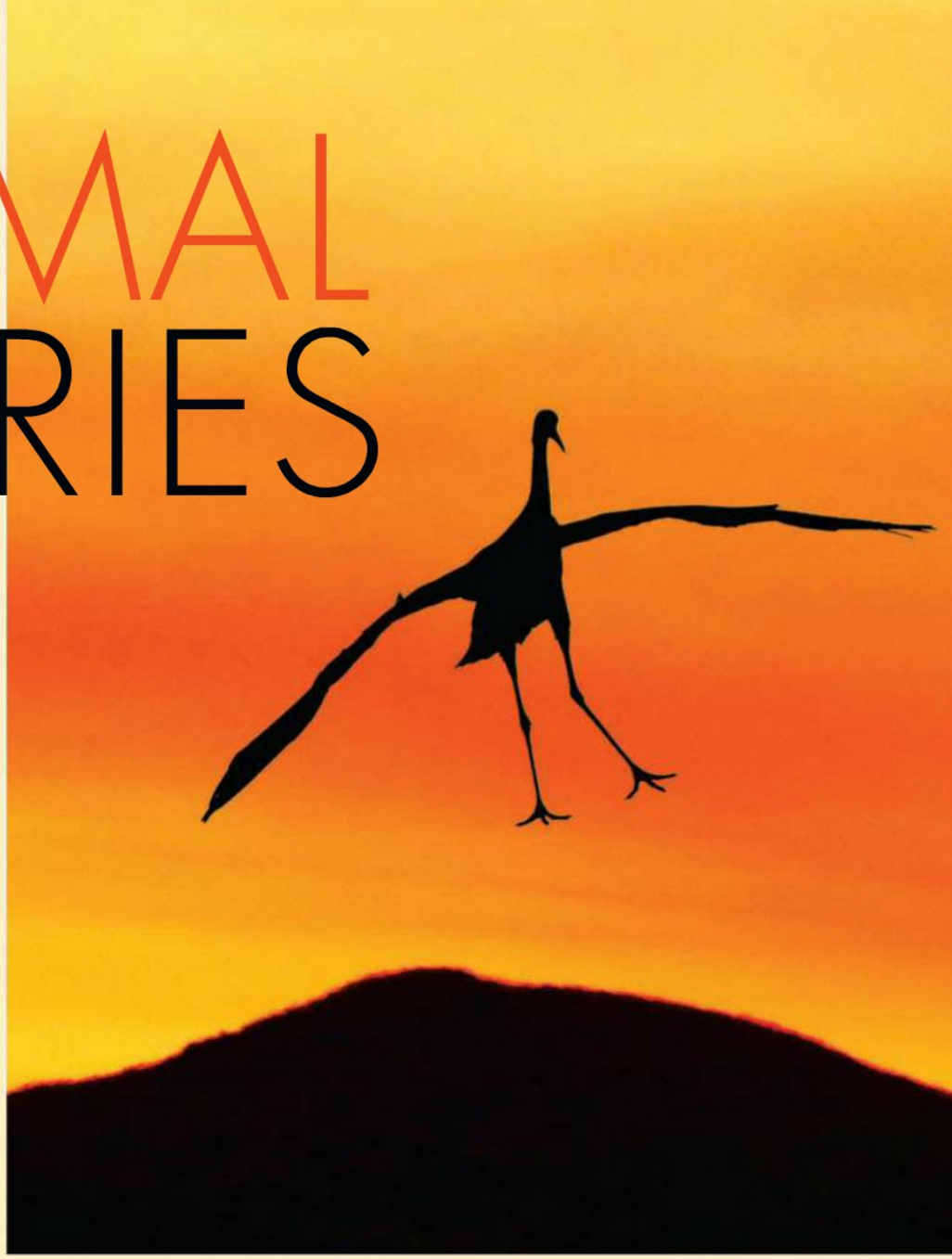


Travel

Part of what makes wildlife photography so alluring is the challenge of learning the behavior and movement of a particular species, exploring the region and climate it calls home, while expanding your photographic skills to capture each animal's story. Professional wildlife photographers share their tips about the regions and animals in which they specialize. Additional full-length interviews and images are up on www.outdoorphotographer.com.

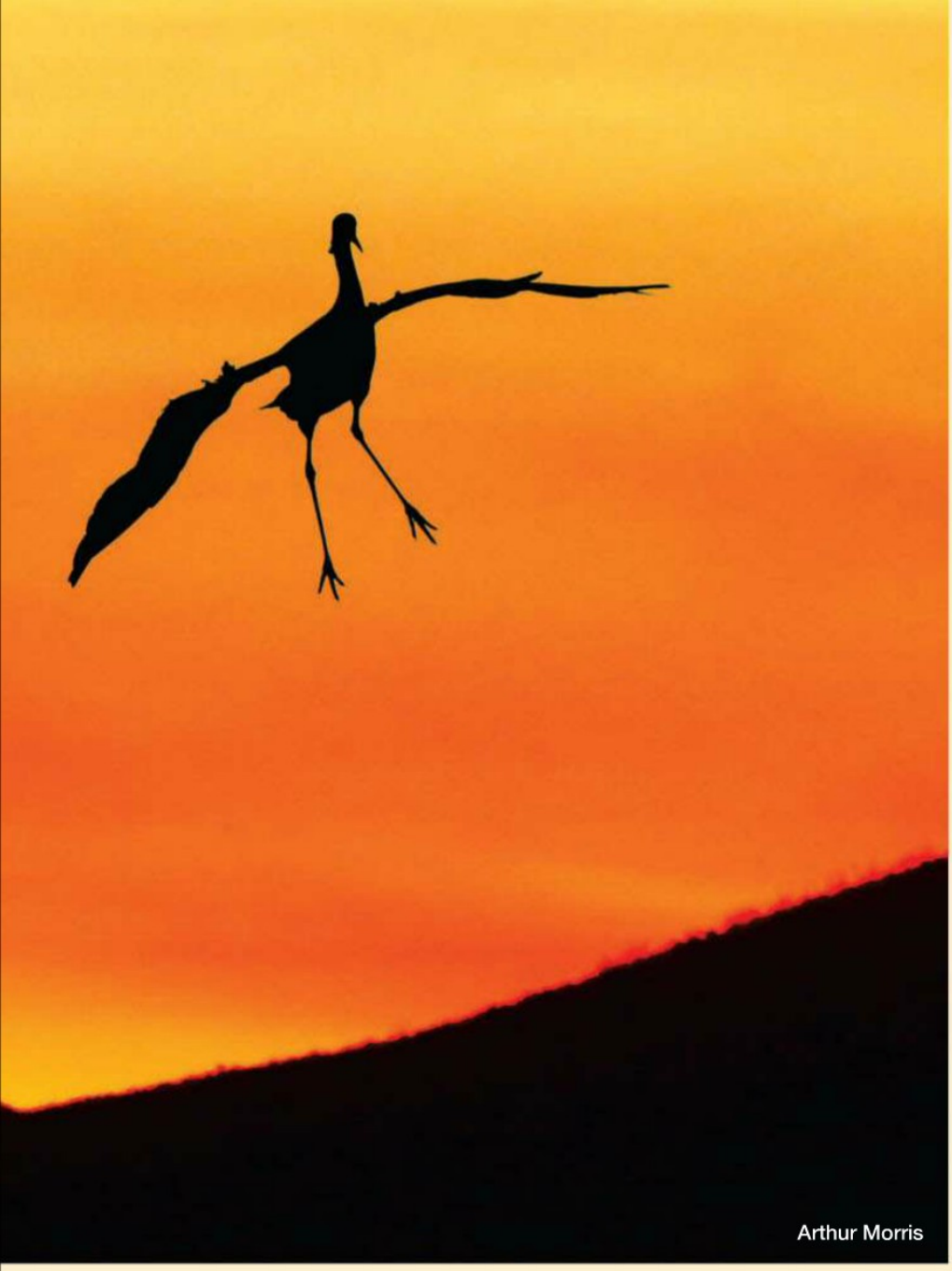
Bosque del Apache National Wildlife Refuge, New Mexico

Located on 57,331 acres along the Rio Grande in New Mexico, the Bosque del Apache National Wildlife Refuge is the winter home to as many as 14,000 sandhill cranes, 32,000 snow geese and Ross's geese, dozens of bald eagles, and many other species of birds. The spectacle of the sunset fly-in and dawn fly-out, in addition to the extensive wetlands, farmlands, riparian forests, arid foothills and mesas, and multicolored mountains, offers endless photographic opportunities.

"The quality of the light is always the most important element to a successful photograph at Bosque, so anytime the light is good is the best time to shoot! When you get extreme weather at Bosque, like thunderstorms, hail or snowstorms, most photographers and tour groups stop shooting and retreat, but these conditions can produce some of the very best situations, with magic light and perfect winds for once-in-a-lifetime opportunities. Learn as much as you can about your subjects, and pay close attention to the weather forecasts to put the odds in your favor. Don't just follow other photographers and photograph at the most popular spots since many of the all-time best photo sessions happen with only a few other photographers around."

—Robert OToole, www.robertotoole.com

"The snow goose—both the blue and the white morphs, and its smaller cousin, Ross's goose—is my favorite species to photograph. The morning goose fly-ins and fly-outs—best accompanied by a brilliant



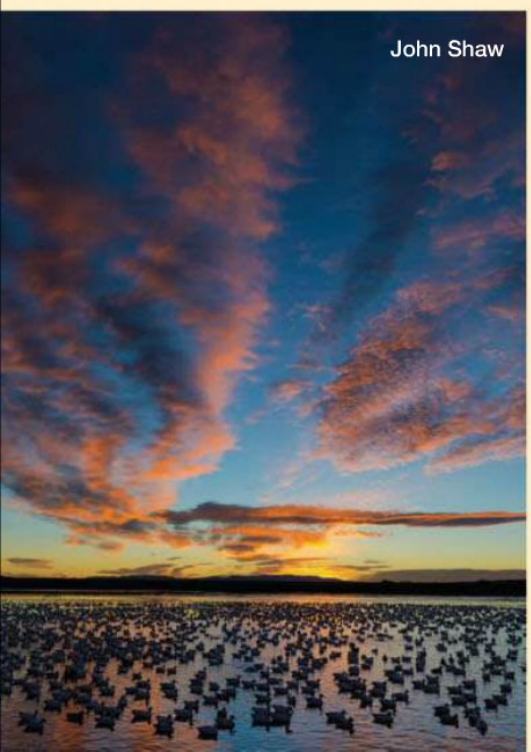
Arthur Morris

red sunrise—can be spectacular. And the goose blastoffs, where 3,000 to 10,000 geese take flight almost instantly in a huge wave, often reminiscent of a tsunami, can be jaw-dropping. Those are best on the rare cloudy days. But when working on bright sunny days, use a Singh-Ray 3- or 5-stop neutral-density filter or a warming circular polarizer to get down to the slow shutter speeds that are needed to create pleasingly blurred images. The blend-blur effect softens the harsh light on clear days. Also, one of the great things about Bosque is that you can create a great image with any lens that you own, from ultrawide-angle to supertelephoto. I've used a Canon 800mm *ƒ*/5.6L IS II, 600mm *ƒ*/4L IS II, 500mm *ƒ*/4L IS II, 100-400mm, 70-200mm *ƒ*/2.8L IS, 24-105mm, 24-70mm II, 16-35mm IS, 15mm fisheye and 8-15mm fisheye."

—Arthur Morris, www.birdsasart.com, www.birdsasart.org

"Watching hundreds of geese lift off all at once is always a thrill. But Bosque offers other subjects to photograph, other species of birds, mammals, including deer, peccaries and rabbits, plus landscape possibilities. This great variety within a small area makes Bosque special; there's always something to photograph. But the magic of Bosque isn't just getting a photo. One of my best experiences there happened when I was standing by myself in a dense early-morning fog, listening to all the geese and cranes, which I couldn't see."

—John Shaw, www.johnshawphoto.com



John Shaw

Robert OToole

Dennis Fast

Churchill, Manitoba, Canada

Located on the remote southwestern shores of Hudson Bay, Churchill, Manitoba, Canada, is well known for being the polar bear capital of the world, a beluga whale-watching hot spot, a birder's paradise and one of the best spots to catch the aurora borealis. There are no roads to Churchill, so the only way in or out is by air or rail, but once there, the Arctic scenery and variety of migrating wildlife make it a photographer's dream destination.

"Polar bears are the iconic symbols of the North and of the threats posed by the changing northern climate. Part of what makes polar bears so appealing is the fact that, though they're powerful carnivores, they manage to maintain an air of regal aloofness; sometimes, they just appear to be overgrown, playful puppies. I never find polar bears boring and can spend hours simply watching them sleep! Having said that, however, there's nothing quite like watching them wrestle. The best time to view and photograph that behavior is in October and November. Part of what makes the wrestling action so fascinating is the sheer power that the bears exhibit. But, to me, the equal fascination is with the restraint they show. With plenty of opportunities to hurt each other seriously, they always seem to know when enough is enough. I usually prefocus on the bears, especially when they're facing off and about to begin a match. As soon as one of them so much as lifts a paw that indicates a shove or stand-up push is imminent, I keep the camera in high-speed mode and fire as many shots as I can.

"Although most people come to Churchill to see polar bears, there are a lot of other animals to keep your attention while waiting for bears to move. Caribou frequent the area in winter, especially near Seal River Lodge, and I've seen as many as 10,000 in the area. Arctic foxes come and go with the fluctuations of the lemming population and are almost as much fun to watch as polar bears. I've seen as many as 30 and more on a given day. Increasingly, red foxes and their color phases of cross fox and silver fox seem to be moving northward at a steady pace. Red foxes are considerably larger than their Arctic cousins and have been known to kill and eat them. However, I've also seen both species only five or six feet apart with no apparent anxiety on anyone's part! Arctic hares are regular in the region, as are snowy owls early in the season. The summer flowers and nesting birds of the Churchill region in June and July are legendary. Sitting quietly near a tundra pond may provide many opportunities for dramatic bird photos."

—Dennis Fast, www.dennisfast.com

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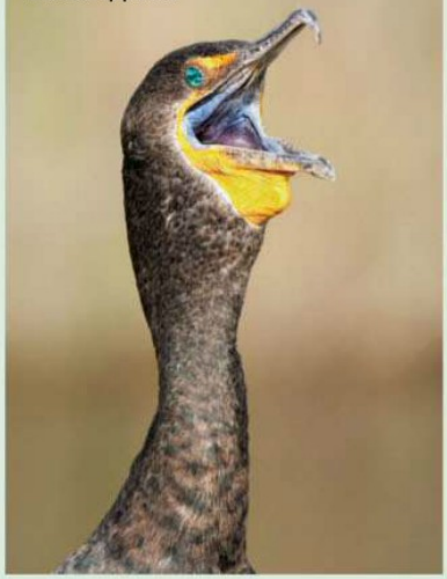
Everglades National Park, Florida

Everglades National Park is located within a massive watershed that extends from Lake Okeechobee to Florida Bay and was established to preserve the southern one-fifth of the Everglades ecosystem as wildlife habitat. The Everglades is the only place on earth where alligators and crocodiles coexist, and is the subtropical refuge to the endangered manatee and Florida panther, plus snakes, sea turtles, numerous bird species and other rare wildlife.

"Within the boundaries of the park, you're only limited by your own grit and imagination. You can run the gamut of ecosystems, from pine uplands to cypress domes to freshwater dwarf mangrove to the 850-square-mile Florida Bay. We have to rewire our brains to not expect the sweeping and obvious vistas we're used to out West and to find the beauty in the chaos of a subtropical swamp. I love reptiles. Snakes, gators and turtles are some of my favorite subjects. They're often misunderstood and hated by many; they're the freshwater equivalent to sharks. Alligators are essential to maintaining the diversity of life we enjoy in South Florida. My favorite

Denise Ippolito



time of year to photograph alligators is during the height of the dry season, which typically occurs between February and March. There are certain places, deep in the backcountry, where alligators are known to congregate by the hundreds. These landscape features are called gator holes. As the water draws down, alligators come from every corner of the Everglades to stay wet and eat in the last remaining water holes. As fish are concentrated in these areas, alligators will launch out of the water to crash down on the trapped prey with incredible force. It's an incredible spectacle to see."

—Mac Stone, www.macstonephoto.com

"I'm absolutely in love with the double-crested cormorants. Their green-jeweled eyes are a special treat to see and photograph. Anhinga Trail in the Everglades is one of the best places that I know of to get extremely close to them and create tight head portraits. They spend hours perched on the railings preening and drying their wings. When they're in the water fishing, you can usually capture some exciting behaviors, as they will often squabble over the fish. I usually visit during the month of February, but as early as mid-January can be good. If you come too early, there won't be many birds hanging out. If you come later than February, you'll likely run into too many mosquitoes."

—Denise Ippolito, deniseippolito.com

Mac Stone

Joseph Dovala

Matthew Meier

Jason Bradley

Channel Islands National Park, California

Channel Islands National Park encompasses five of the eight California Channel Islands, but its surrounding one mile of ocean is where the real treasures can be found. With marine life ranging from microscopic plankton to the blue whale, the Channel Islands are home to over 2,000 plant and animal species, of which 145 are found nowhere else in the world. The park is only accessible by boat or plane, and offers no lodging, food stores or gear rental services, making it one of the least visited national parks in the U.S. But this isolation has allowed for the protection and preservation of an abundance of natural and cultural resources.

"As you prepare to shoot in the Channel Islands, think versatility and be prepared for anything. There are tiny animals like sea slugs and giant animals like whales. One of the reasons I fell in love with the Channel Islands National Park, and why it feels most like home to me, is that it offers so much. One of the big mantras of the underwater photographer is to *get close, and then get closer.* Said in another way, don't keep your distance from scenes and subjects underwater—even if they're big, toothy sharks. I tend to stick to macro lenses or fisheye lenses, as both can keep me close to what I'm shooting."

—Jason Bradley
www.bradleyphotographic.com

"Swimming in a healthy kelp forest is like flying through a terrestrial forest with scores of life-forms living on, in and under the giant algae. Mostly, I shoot upward and as close to the subject as possible to get good contrast and minimize water-robbing sharpness. If you're going to shoot topside only, spring after a decent rainy season is the best, for the islands erupt in color. Underwater, you need to have patience and revisit areas over and over, for you never know when someone special is going to swim on by. And, get close."

—Joseph Dovala, www.jcdovala.com

"One of my favorite species to shoot at the Channel Islands is the endemic Garibaldi fish, essentially a larger cousin to the clown fish. Garibaldis are bright orange in color, and the juveniles are covered in radiant blue spots. The males will challenge anything or anyone that gets too close to their eggs, regardless of size, and they keep a constant vigil by regularly swimming patrol patterns around their territory. While it's fun to shoot the male Garibaldi tending to its eggs, I prefer to use their protective behavior to set up a shot nearby and wait for them to patrol into my frame. This allows me to compose a nice underwater scene and then take a photo every time the Garibaldi swims in front of my lens, adding a pop of color to the final image.

"The Channel Islands taught me that sharks are more afraid of us than we are of them. I've spent numerous dives waiting/hiding in the kelp, hoping a soupfin shark would swim close enough to me to photograph. The problem is, they're afraid of the noise of our bubbles when we breathe in and out through our scuba regulators. So, to successfully photograph them, they must swim close enough while you're between breaths, not making any noise, or they will startle and swim away."

—Matthew Meier
www.matthewmeierphoto.com

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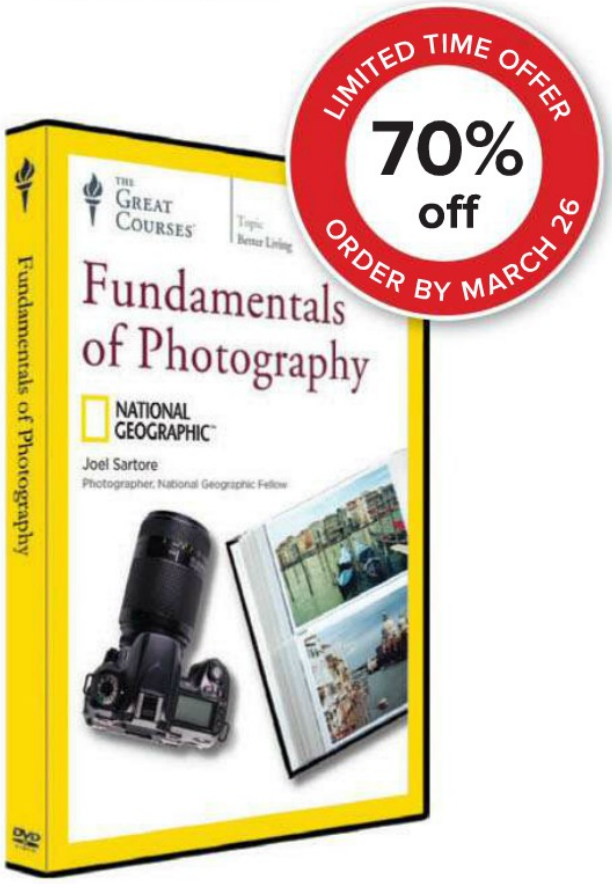

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Matthew Studebaker

Alaska: Arctic National Wildlife Refuge And Barrow

A visit to Denali National Park & Preserve and the tallest mountain in North America, Mount McKinley, is on the top of the list for many tourists when visiting the great state of Alaska. But for wildlife photographers, the more remote destinations to the north provide an experience unlike any other. Arctic National Wildlife Refuge (ANWR) covers approximately 19.64-million acres of land and water in northeastern Alaska, and contains the largest area of designated wilderness within the National Wildlife Refuge System. With an Arctic and a sub-Arctic landscape, ANWR is known for migratory wildlife behavior. Northwest of ANWR is the northernmost American city, Barrow, Alaska, which receives 24-hour daylight between May 10 and August 2. Located on the Arctic Ocean, Barrow is only accessible by air or sea travel. It's home to giant snowy owls, whales, seals, walrus, caribou, moose, and hundreds of other rare and endangered species.

"I seek out three migrations in ANWR: 1) loons, eiders and other Arctic birds in mid-June near the Dalton Highway just south of Deadhorse; 2) polar bears in the Barter Island region during August through early October; and 3) caribou herds during mid- to late October just north of the Brooks Range mountains and just off the Dalton Highway. I can fairly accurately predict the timing and reliability of the birds and bears, but the caribou take much more luck and persistence.

"ANWR is beautiful, but brutal. I find myself alone with landscapes that are seldom seen and photographed. If this is your first time to ANWR or your first time photographing north of the 66th parallel, consider meeting up with a guide who has experience and can make your trip worthwhile."

—Matthew Studebaker
www.studebakerstudio.com

"Ptarmigans are a study in changing color to blend into your habitat. Two species can be found around Barrow, the willow ptarmigan and the rock ptarmigan. Both species become pure white around November, gradually adding brown pigments to their plumage as the snow melts. This process allows them to always match to the ground around them. The birds seem conscious of the color of their plumage and will move quickly over the ground when their plumage doesn't match, while slowing down and remaining motionless when they blend in again. Snowy owls can be abundant when lemming populations peak and are difficult to find in other years. Sometimes, if you're really lucky, you might even witness an encounter between snowy owls and foxes.

"I typically bring my longest lens (600mm *ƒ*/4), my longest zoom (70-200mm *ƒ*/2.8) and my shortest zoom (24-70mm *ƒ*/2.8) to Barrow. I almost always use a tripod when shooting with the longest lens, except when I'm shooting from the window of my car using a beanbag."

—Paul Bannick, www.paulbannick.com

Paul Bannick

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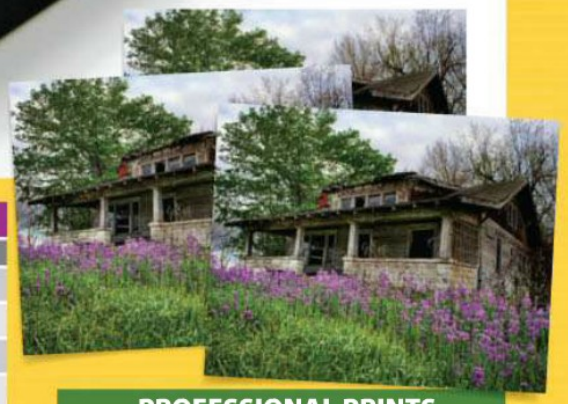

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Text & Photography By Mario Davalos

Canon EOS-1D Mark IV,

The Intruder: Great Egret Among Scarlet Ibises

Caroni Swamp, Trinidad

I had been in the northern mountain range of Trinidad for four days already, and I kept hearing about Caroni Swamp and the roosting of the scarlet ibises. I had seen illustrations of the birds on flags, the Trinidad and Tobago coat of arms and promotional materials, but I had never seen a scarlet ibis in person before. Also, I must admit, it wasn't on my target species list for that assignment. I had flown to Trinidad to see the lekking (the competitive mating display) of the white-bearded manakin and to search for the tropical screech owl, but I just kept hearing about this roosting site so, finally, on day five, I decided to go there.

I wasn't prepared for what was about to happen! First, a few great egrets and little blue herons flew above us without impressing me much, but suddenly these bright, intense, vermilion birds started to arrive from everywhere and landed in the same spot. They looked like flying fruits or flowers. As they kept coming, noise started to build and there was a lot of activity happening all at the same time and in every direction. It was overwhelming. I knew my time frame was limited due to the lighting conditions, so I had to act fast. I started to photograph the flying birds and to switch between my two cameras.

I shot probably about 300 images in under 30 minutes, but still I was missing a shot that made me feel I had something unique, something memorable. Then, in an instant that can only be described as clichéd serendipity, I saw a great egret land right in the middle of the red and green

Canon EF 500mm *f*/4L, Gitzo GT3531LSV Series 3 Carbon 6x 3-Section G-Lock Systematic Video tripod, Wimberley head, 1/125 sec. at *f*/4, ISO 1600

turmoil that was the roosting site. I looked through the viewfinder and started to compose the frame. It looked like a Christmas tree or a very noisy flower garden. The white plumage of the egret had given me an interesting point to compose around, and I was very happy with the results.

Once I saw the image in my screen, I was surprised how bright the red was, so I actually desaturated the image a bit and slightly cropped from the bottom to make it more panoramic. Some images are made by skill, some are made by luck, but this one was mostly about being in the right place, at the right time, while taking advantage of it. **OP**

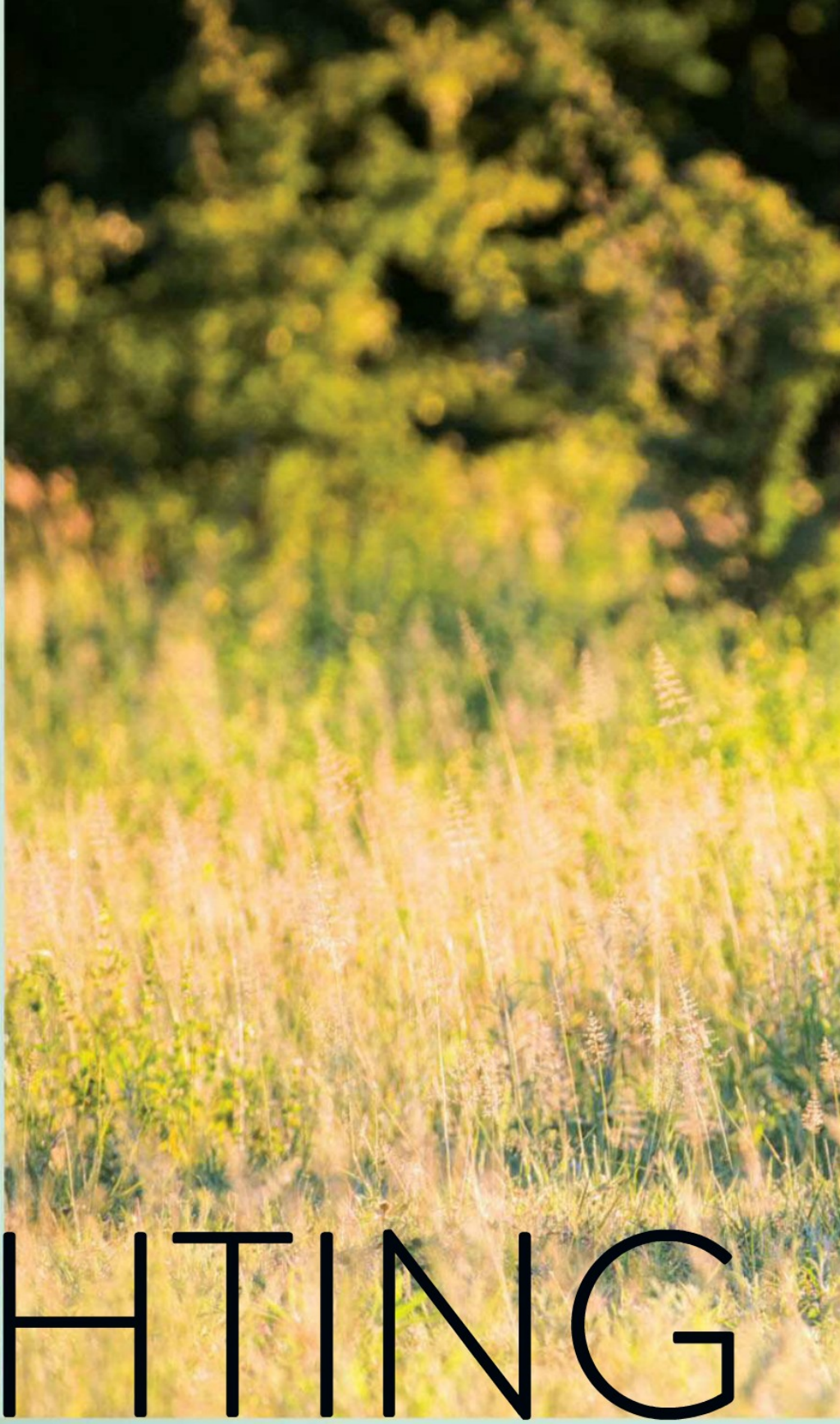
You can see more of ***Mario Davalos****' photography at www.mariodavalos.org, and read his blog at blog.mariodavalos.com. You can follow him on Facebook and Twitter at facebook.com/MarioDavalosPhoto and twitter.com/davalette.*

How 2

As a nature photographer, too often you're at the mercy of existing natural light. Wouldn't it be great if you could carry a small sun with you to direct light where and when you wish? Well, to some extent, you can, with an LED or a flash—a vital, although often ignored, nature photography accessory, particularly for wildlife photography.

Flash has multiple uses: It can be used at low power to add an attractive catchlight to a wildlife subject's eyes; it can provide fill light for a subject in shadow; and it can be used creatively in low light to produce surreal images. It can add punch to subjects in flat light, revealing colors. It can be used to photograph subjects in low light, and to freeze the action of fast-moving subjects, such as a flying hummingbird. I'm always thinking of ways to creatively experiment with flash, and I encourage every nature photographer to do the same.

I should note at the outset that by "flash" I don't mean the pop-up flashes that are commonly found on many DSLR cameras, which don't have sufficient power for most critical uses. If you really want to get serious about flash photography, I recommend a good off-camera flash, preferably one with a lot of power. Flashes with higher guide numbers (a measure of the flash's output) have more range, expanding the reach of your flash and its potential for creative use.



LIGHTING WILDLIFE

A compact light or portable off-camera flash can add an extra dimension to your photos of animals and birds

TEXT & PHOTOGRAPHY BY IAN PLANT

Fill Light

1 One of the primary uses of flash or a small LED is to introduce fill light to balance exposure and light your subject. Fill light is useful when your main subject is darker relative to its surroundings or you want to give your main subject more emphasis. For this image, the field was lit by gorgeous morning light, but unfortunately, the cheetah was standing in the shadows. I used flash to create fill light to balance the exposure and to add catchlights to the cheetah's eyes. I reduced the flash's power setting, as I didn't want to make the cheetah too bright, resulting in an artificial look—instead, I wanted the fill light to blend in with the rest of the scene.

Nxai Pan National Park, Botswana. Canon EOS 70D, Canon EF 200-400mm ƒ/4L IS USM with internal 1.4x extender, ƒ/5.6, 1/200 sec., ISO 400

Flash Shooting Modes

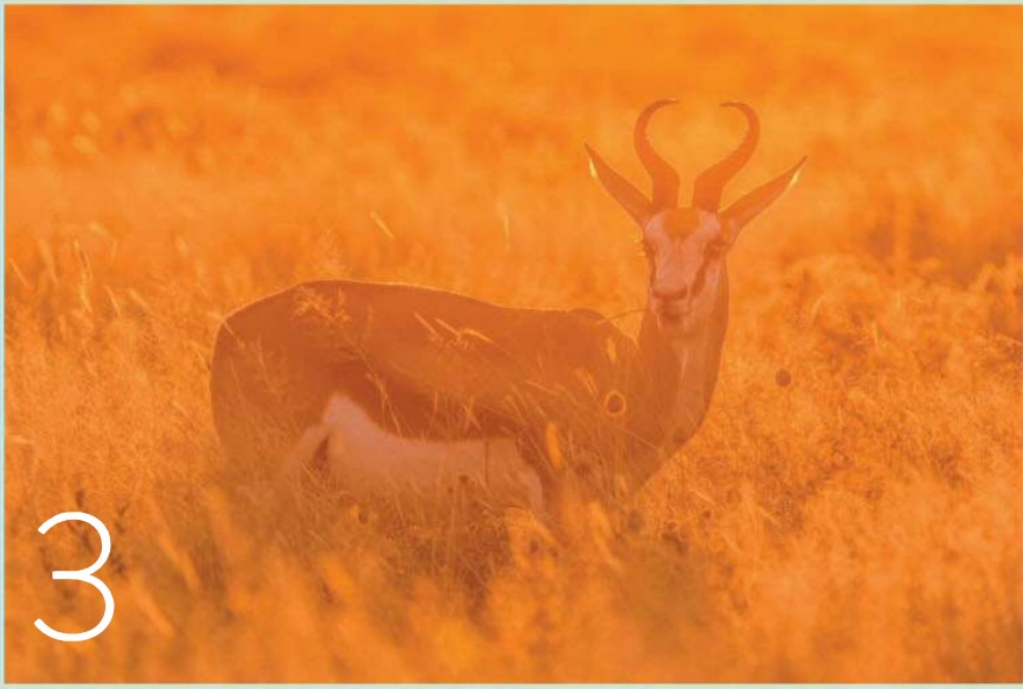
Through-the-lens mode (E-TTL for Canon users, i-TTL for Nikon users) is the most useful mode for flash photography for most uses. This allows sensors in the camera to automatically adjust the amount of flash output, taking into account subject distance and your camera and flash exposure compensation settings. Manual mode may be preferable in specific situations, usually when conditions are very controlled, such as at a bird feeder, where the distance between the flash and the subject doesn't significantly change. In manual mode, you'll have to manually set the flash power to the desired level.

Exposure Compensation

When shooting flash, it's important to learn how to use flash compensation, which allows you to control flash output levels. When used improperly, flash can look artificial; flash compensation can help you avoid an "over-flashed" look, with natural and pleasing results instead. Flash compensation is actually quite easy to use, as it works very similarly to exposure compensation on your camera. It's measured in stops (generally, ⅓-stop increments), and you can dial in extra flash exposure (+ stops) or less (- stops). Almost always, I end up reducing flash output by dialing flash compensation to a negative number, often going as low as -2 or -3 stops. This helps keep the flash illumination from looking artificial, as at reduced power, light from the flash mixes with the ambient light for a more natural result. For most uses, your aim will be to use flash to add just a hint of additional light so the result is complementary to the natural light and not overpowering. There's no easy rule of thumb, as the amount of flash compensation you require will depend on ambient light conditions, your subject, and the distance between your subject and flash. Try starting at -2 stops, and experiment from there until you find the perfect amount of fill light.

Sync Modes

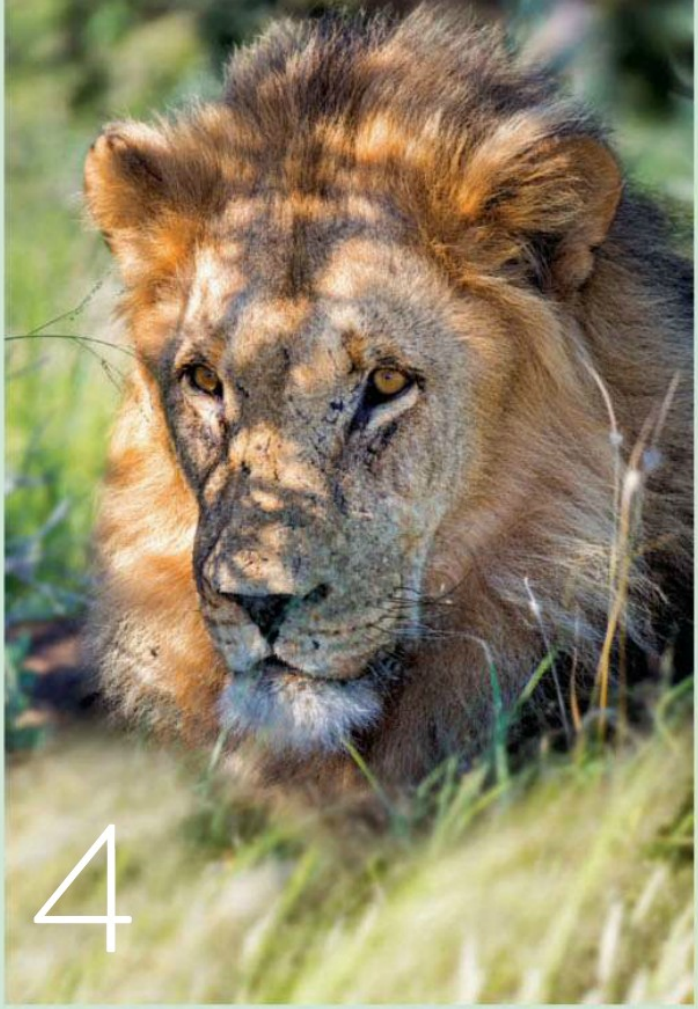
It's important to note that most camera systems won't let you use shutter speeds higher than 1/200 or 1/250 sec. when working with flash, unless you enable high-speed sync mode (HSS for Canon, Auto FP for Nikon). Basically, high-speed sync works by firing the flash longer than it does in standard flash mode, which, unfortu-



Creative Use Of Flash

2 You can also use flash in a more creative fashion, such as mixing long-exposure blur with stopped action. For this image of snow geese in flight during early-morning twilight, I used flash to freeze the motion of the birds, setting the camera exposure to record the low ambient light. The result is a "ghostly" look, as if two separate exposures had been combined.

Bosque del Apache National Wildlife Refuge, New Mexico. Canon EOS 5D Mark III, Canon EF 16-35mm ƒ/2.8L II USM, ƒ/5.6, 1/15 sec., ISO 400



Backlighting

3 I love shooting in backlighting, especially at sunrise and sunset. Sometimes, I find that just a hint of fill light can greatly benefit subjects shot in backlight situations. For this photo of a springbok, the sunset backlighting was absolutely stunning. I dialed back the flash compensation, adding just a hint of fill-flash to prevent the subject from being rendered in silhouette and to add catchlights to the eyes.

Etosha National Park, Namibia. Canon EOS 70D, Canon EF 200-400mm ƒ/4L IS USM with internal 1.4x extender, ƒ/8, 1/250 sec., ISO 400

Soften Hard Shadows

4 When working in harsh light, adding some fill can soften shadows, allowing for a more pleasing image. With this male lion resting to escape the heat of the day, the lion was partially in the shade, with dark shadows falling unevenly across his face. I used flash at low power to add some fill light to the shadows, balancing the exposure. Notice that I didn't eliminate the shadows entirely; I wanted to keep a hint of the shadows to add some interest to the shot.

Central Kalahari Game Reserve, Botswana. Canon EOS 5D Mark III, Canon EF 200-400mm ƒ/4L IS USM with internal 1.4x extender, ƒ/5.6, 1/160 sec., ISO 100

Catchlight

5 Light can also be used to add an attractive catchlight to your subject's eyes, adding life and sparkle to the eyes. For this image of a white-headed capuchin monkey, I used my flash at low power to balance the exposure between the shadowed monkey and the brighter background, placing more visual emphasis on my subject and adding catchlights.

Osa Peninsula, Costa Rica. Canon EOS 5D Mark III, Canon EF 200-400mm ƒ/4L IS USM with internal 1.4x extender, ƒ/5.6, 1/200 sec., ISO 3200

Using Flash As The Main Source Of Light

6 In certain circumstances, you may wish to use flash as the main source of light, such as when shooting at night, when you won't have any ambient light to mix with the flash. For example, I came across this tent-making bat underneath a palm leaf during a night walk. With no ambient light, I used my flash as the primary light source.

Osa Peninsula, Costa Rica. Canon EOS 5D Mark III, Canon EF 70-200mm ƒ/2.8L IS II USM, ƒ/22, 1/125 sec., ISO 100

Bringing Out Color

7 A hint of fill light can work wonders when shooting in flat lighting situations. Fill helps reveal color and contrast. For example, with this image of a buff-tailed coronet, I used flash at low power to balance the light between the sunlit leaves in the background and my main subject, which was in flat shadow light. The flash reveals the bird's brilliant colors, similar to how the bird would have looked in bright sunlight.

Andes Mountains, Ecuador. Canon EOS 5D Mark III, Canon EF 200-400mm ƒ/4L IS USM with internal 1.4x extender, ƒ/8, 1/15 sec., ISO 400

nately, reduces the maximum output of your flash and thus can limit your ability to illuminate more distant subjects.

Another consideration is curtain sync. The shutter on your DSLR has both a front curtain (which starts the exposure) and a rear curtain (which ends it). By default, your flash is set to fire when the front curtain opens (this is known as front curtain sync). Front curtain sync will work fine for the vast majority of your flash uses, but you have the option of setting your flash to rear curtain sync, which fires the flash right before the rear curtain closes at the end of the exposure. With longer exposures, you can achieve creative motion-blur effects with moving subjects, using the ambient exposure to blur the motion and flash to stop the action. Rear curtain sync ensures that any motion blur shows up behind the moving subject, rather than in front.

Accessories

A bracket is probably your most useful flash accessory. Raising or moving the light off-camera helps avoid an artificial red-eye look in your photos (though, in most animals, the color is different than with people), which results from the flash bouncing light directly off the animal's eye back to the lens. A bracket changes the angle of the light relative to the lens, reducing or eliminating the red-eye effect. If using a bracket, you'll need an off-camera shoe cord to connect your flash and camera and retain TTL control. LED or other continuous lights don't need a tether.

Another useful accessory is an extender, which works by mounting a Fresnel lens in front of the light, focusing the beam of light and allowing it to travel farther. This is helpful when photographing distant wildlife subjects or in situations where you need a narrow beam of light to selectively light your subject. Other accessories are designed to soften and diffuse the light coming from your flash, such as softboxes and diffusers. These are particularly useful when photographing intimate and macro subjects, where the harsh light of an un-softened flash may be undesirable. Colored filters and gels are also available if you want to change the color temperature of the flash light (which is a neutral light similar to middle-of-the-day daylight). Warming filters may be especially useful when trying to balance fill light with the colorful light of sunrise or sunset.

Finally, an external flash battery pack is useful when shooting rapid bursts of images. Battery packs recycle much quicker than the internal flash battery unit, and also allow you to shoot flash for longer without having to switch batteries. OP

Ian Plant is an OP Blogger and a frequent contributor to the magazine. Go to outdoorphotographer.com to see his online-exclusive articles, and you can see more of his work at www.ianplant.com.

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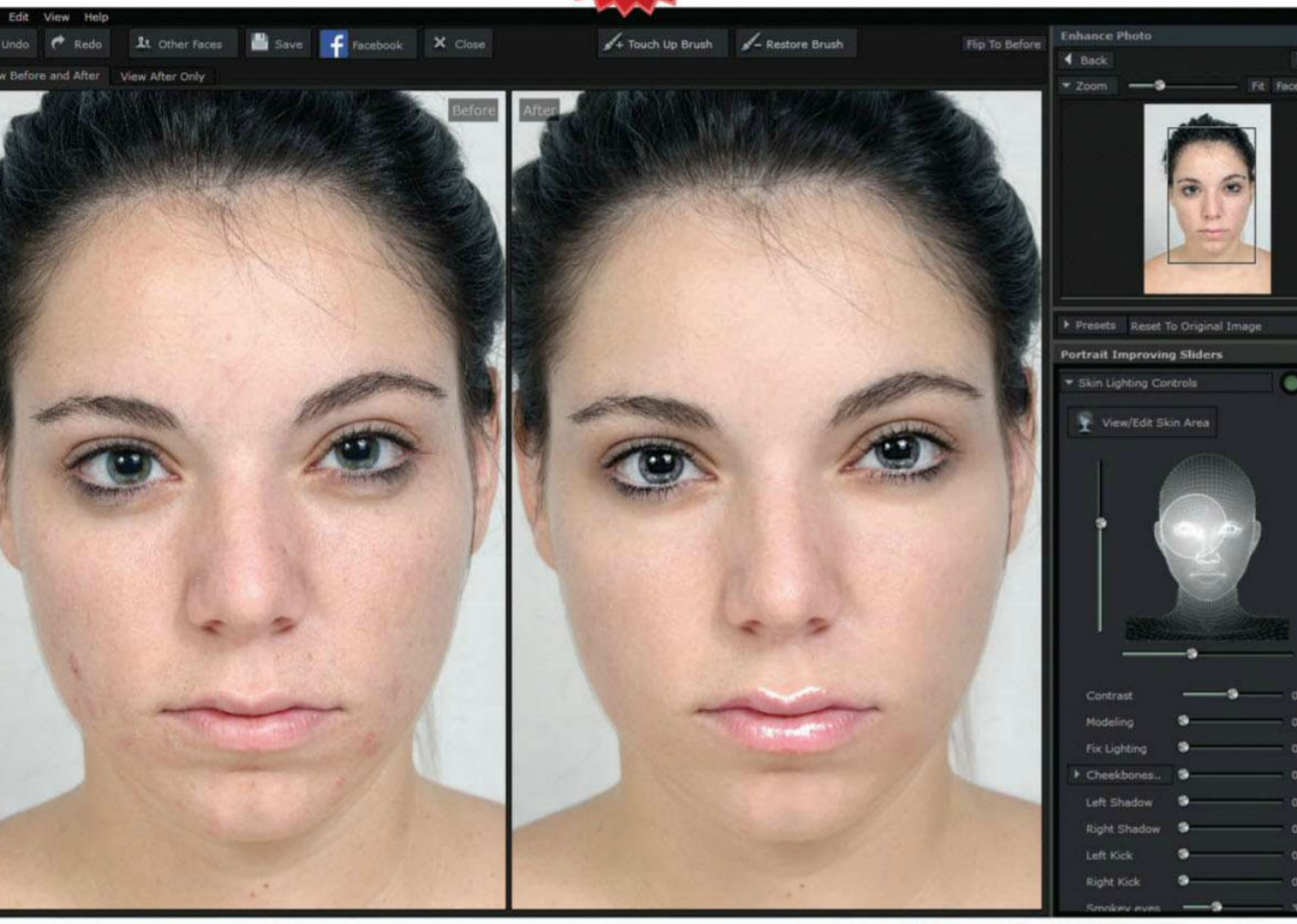

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ABOVE, RIGHT: The final, properly exposed image of a fall scene of Glacier National Park's Bowman Lake. Figure 1 and 1a: Spot-metering on the clouds gave an exposure of 1/125 sec. at f/16 and ISO 100. Note that, in the viewfinder, the exposure indicator is right in the middle of the scale. The clouds will render as middle gray.

TEXT & PHOTOGRAPHY BY RICK SHEREMETA

Having taught workshops for many years, I've come to find that the biggest problem students have, both novice and experienced alike, is how to meter and set exposure for ambient light. You may rightly ask, does it really matter since my DSLR generally comes up with a good exposure on its own, and I can always fix problems later in Photoshop or Lightroom? While this may be true most of the time, a lack of understanding of metering and exposure control can be a severe handicap to the photographer. By relying totally on the camera's auto or program modes, not only is creative control hampered, but the chances of getting consistently good images will be pure luck. Getting as close as possible to optimal exposure initially will provide much more latitude

Final Adjusted Image

Figure 2: Using the same scene as in Figure 1, I metered the bright blue sky. I wanted it to be 1 EV or stop brighter than neutral-toned as the meter shows. In this case, I didn't have to change any of the camera's settings; the sky is 1 EV brighter than the neutral gray-toned clouds.

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when it comes to post-capture processing, with less time and effort required to make necessary or interpretive adjustments. Furthermore, if exposure is too far off, corrective adjustments will be limited or not even possible. Photography is all about the control and use of light as it interacts with the subject to achieve a desired effect. With that in mind, let's take a look at how light is measured and how those measurements are used to set exposure for outdoor photography.

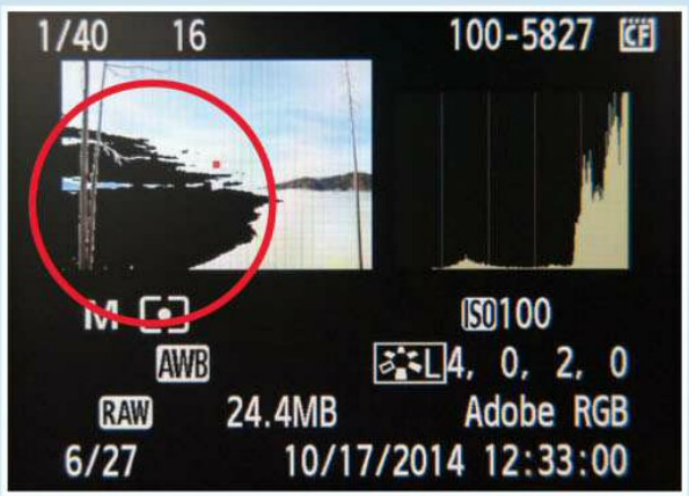
DSLR camera meters measure light reflected from the subject through the lens (TTL). All camera meters are calibrated to measure 12.5% gray as neutral tone, and this forms the basis upon which all exposure settings are made. Before venturing too far, understand that there are three means by which exposure is controlled: shutter speed, aperture and ISO. Creation of a photograph requires a conscious effort to choose which of these parameters, singly or in combination, govern to achieve the desired outcome. It's important, therefore, to understand the role that each plays, so let's take a brief look at what they actually do.

The Exposure Equation

Shutter speed is used to control motion. Is the goal to stop motion or to blur motion? A faster shutter speed will stop motion, and the faster the subject is moving, the faster the shutter speed must be to accomplish this. Conversely, the slower the shutter speed, the more any moving object will be blurred. Although this may be somewhat intuitive, a full understanding of the correct shutter speed to use only will come with experience and experimentation. With that in mind, doubling or halving the shutter speed will reduce or increase exposure respectively by 1 exposure value (EV) or stop. For instance, going from 1/125 sec. to 1/250 sec. would reduce exposure by 1 EV, or 1 stop, and going from 1/125 sec. to 1/60 sec. would increase exposure by 1 stop.

The lens aperture is the size of the opening through which light passes on its way to the sensor or film plane, and is used to control depth of field, i.e., how much of the scene is sharply in focus from near to far. Aperture is measured in *f*-stops, *f*/2.8 being considered a wide aperture, allowing more light, but with a very shallow depth of field, whereas *f*/16 is a small aperture that permits much less light, but with a much greater depth of field. Each full *f*-stop represents a doubling or halving of light. As an example, going from *f*/2.8 to *f*/4.0 (a full stop) halves the amount of light reaching the sensor, and vice versa.

The last parameter that has a bearing on exposure is ISO. Suffice it to say that this is a measure of the sensor's sensitivity to recording light—the higher the number, the greater the ability to capture low light. Conversely, the lower the ISO value, typically 100 for most cameras, the higher the image quality. At high ISO values, digital noise can be introduced into an image. This will become more apparent in shadow or dark areas, appearing as red and green dots. Again, a doubling or halving of the ISO value doubles or halves the amount of sensor light sensitivity, respectively. It's always best to set ISO at its lowest value, and then increase it, if needed, to obtain higher shutter speeds and/or smaller apertures in low-light levels.



3

Figure 3: The image at left shows the LCD preview of the sky taken from above a brightly lit fog layer. The shot was purposely overexposed to show a highly clipped histogram. The image below, with Highlight Alert set, shows the overexposed area flashing in black (circled in red), known as "blinkies."

Metering Modes And How They Work

Now that we understand what controls exposure, let's get into metering. The first concept to understand is that every item in a scene will have a certain tonality, or level of brightness, regardless of its color, and this can vary depending on ambient light conditions. Some elements may be the same, while others may vary by several stops or exposure values (EVs). The important factor to realize is that their relative relationships to each other will stay the same regardless of lighting conditions or any changes thereto. For example, an evergreen forest will always be 1 stop darker than a neutral-tone blue sky so, as the sky gets darker, the forest still will be 1 stop darker yet. Understanding that concept, and knowing what to expect, is the whole key to understanding metering and control of exposure. Figure 4 shows some "rule of thumb" values for different objects that I've used and found to be reliable over the years. Under-

Figure 4: In this image of Glacier National Park's Running Eagle Falls, I metered the white water and adjusted the shutter speed until the meter reading was +2. Then, for confirmation, I metered the rocks, which measured 0 EV. See my "rules of thumb" for setting initial exposure below.

stand that these are only starting values, as exposure is relative. It can vary throughout the day and change with the weather. Nothing is absolute—you can always get creative, basing exposure on how you would prefer to interpret the scene—after all, it's your photograph.

If you look through your viewfinder, you'll notice the meter; it's either at the bottom or side, depending on the make and model of the camera used. Now, depress the shutter release halfway to engage the meter and point the camera at different parts of a scene having different amounts of brightness. As you move the camera around, you'll notice that the meter readings change depending on how light or dark the objects are. I find that the best way to proceed, and the way I teach my students, is to work in Manual mode. That way it's possible to adjust both shutter speed and aperture independently, as desired, while the camera's meter measures the resulting exposure, i.e., showing how bright or dark different things are relative to each other in stops. So, for example, if you change shutter speed, the meter's pointer will move to reflect how that change has affected the exposure, either toward plus or minus on the scale.

The next item to consider is what metering mode to use, and there are several options available, from Evaluative/Matrix/Pattern (as it's called, depending on the camera manufacturer) to center-weighted to partial to spot—each going progressively from a larger to smaller area within the viewfinder.

Spot Meter Readings To Use As Starting Points For Estimating Exposure

Rocks	-1 to +1
Evergreens	-1
Green Foliage	0 to +1
Whitewater	+2
Blue Sky	-1 to +1
White Cloud	+2
Green Grass	-1 to +1
Yellow Flower	+1
Palm Of Hand	+1

Spot metering is my first choice; if your particular camera doesn't have spot, partial would be the next choice. Metering a smaller area allows segregation of specific areas or objects, and, yes, you can zoom in to better isolate an element, as needed. Meter different things and watch the meter change as you do so. I suggest first starting with the sky (measure on the northern sky, if blue), then meter other mid-ground and/or foreground elements, noting the different meter readings. Regardless of what or where you initiate metering, the first question to ask yourself is, how bright do I want it to be rendered? This will start to make more sense in the example in Figure 1. In the first case, we'll use an area of gray clouds to set the initial exposure. This works out well since normally we'd expect the gray to be neutral-toned—remember our "rules of thumb." As a check, meter something else like the forest on the side of the mountain; most likely, we'd expect our meter to now read -1 EV. If it does, we're probably good to go, but just to be sure, throw in something else like a neutral-toned gray rock as a final check. Does that meter 0 EV or close to it? If it does, we're golden, and the overall scene will be well exposed.

Going one step further, use the same scene, but now meter the bright blue sky as depicted in Figure 2. The resulting meter reading now shows +1 on the scale, or 1 stop brighter than neutral tone, which is to be expected since it looks brighter than the gray cloudy area. In this case, I started with the blue sky, but could have just as well used it as a check to confirm other scene meter readings, as was done in the first example.

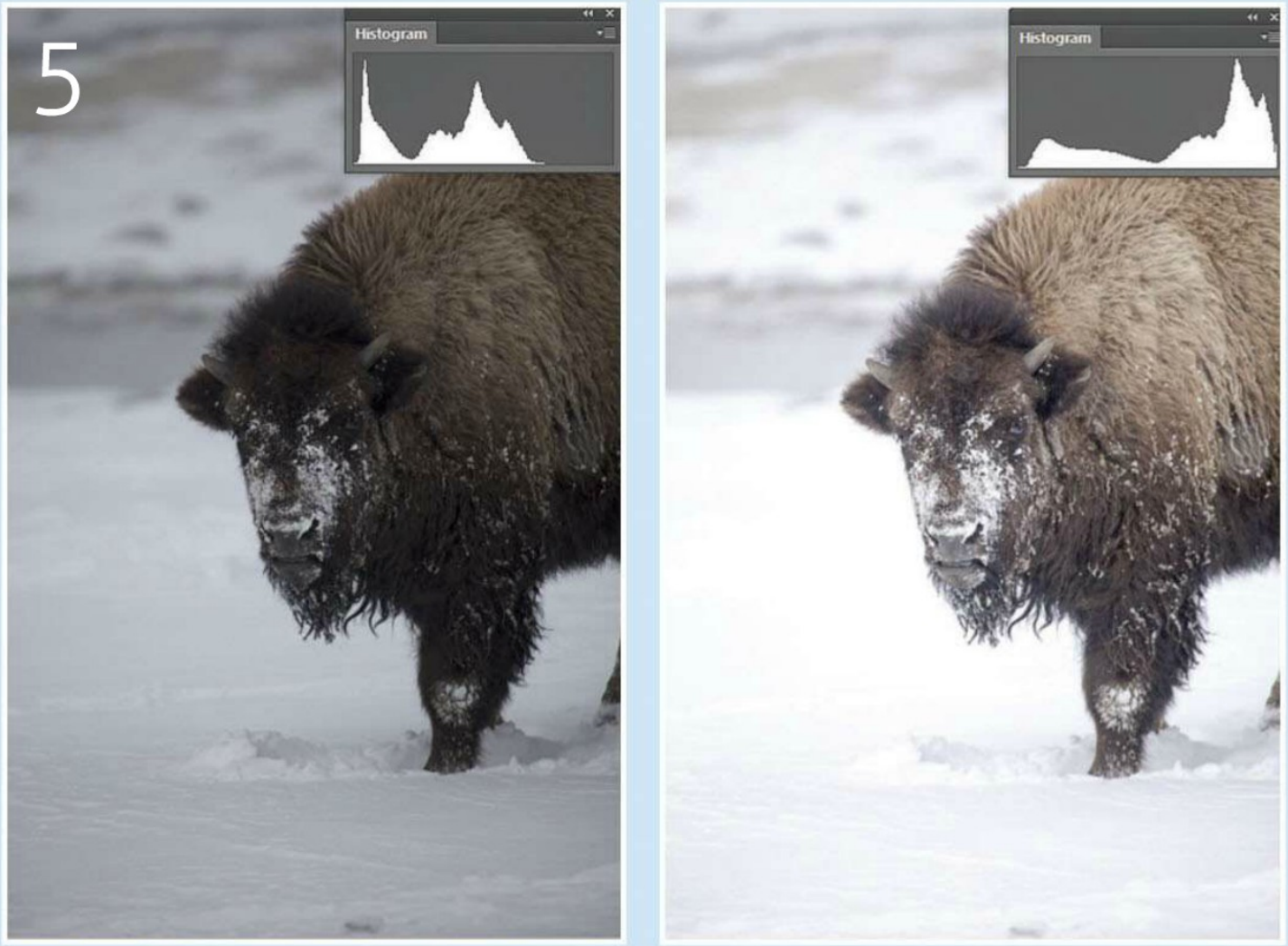


Figure 5: An image of a bison in Yellowstone National Park shot in Shutter Priority with bright snow dominating the exposure. The image on the left has no exposure compensation, resulting in a very underexposed animal and gray snow. The image on the right is at an exposure compensation of +2 EV; the snow is correctly rendered as white, and the animal is correctly exposed. Notice the difference in histograms between both images.

Now that we've gone through this exercise, it's time to take a test shot and then check the preview screen along with the histogram for confirmation of good exposure. Don't just rely on the preview you see on the LCD screen, as it can be misleading—the key is a correct histogram. Learning how to properly interpret the histogram is an art unto itself, as it can vary considerably from scene to scene based on any number of factors—time of day, uniformity of light, cloud cover, etc. Bright areas show on the right and dark areas on the left. As long as the histogram isn't severely clipped (jammed to the right or left), indicating over- or underexposure, respectively, things should be okay. Anything clipped will have no detail, and it can't be recovered in postprocessing no matter what's done. Overexposure is far worse than underexposure, particularly where sky is concerned, and is to be avoided even if shadow areas need to be compromised.

Setting the Highlight Alert warning for your LCD preview screen, through the camera's custom functions, will aid considerably in your understanding of how the histogram reflects the amount of overexposure. In the preview screen, any area(s) overexposed will blink to alert you. Unfortunately there's no preview alert for underexposure. Figure 3 shows a typical situation to illustrate this. As long as overexposure doesn't take up a significant amount or important part of the scene, it may be acceptable. If you feel that too much of the scene is overexposed, readjust the shutter and/or aperture in 1-stop increments, taking additional test shots until there's a tolerable amount of "blinkies" remaining.

Where we can get into trouble is when meter readings measure greater than +2 or less than -2 (fortunately, most meters blink to warn of this occurrence). In both situations, it's possible something will be blown out or completely underexposed, generally an undesirable result in either case. There are exceptions to this, for example, the sun, whitewater, bright snow, the brightest part of a cloud, etc., where there's little or no detail anyway, so these things can show as overexposed with no ill effects to the overall scene. The key is to know and understand what and how much over- or underexposure is acceptable—this will come with experience. Bear in mind that metering, setting exposure based on the meter reading, taking a test shot and checking the histogram are all part of the normal photographic workflow—it's an iterative process that needs to be gone through with each and every shot until you get proficient at it.

How about other metering modes? They work the same as spot metering except that a larger portion of the image frame is used to measure light input. Personally, I rarely, if ever, use anything but spot and evaluative metering, but you may find that other modes work for you, depending on the type of

photography you do. I find that evaluative metering is best suited to midday or overcast conditions when the entire scene is evenly lit with consistent light. Metering and exposure settings will be most troublesome when light is variable, or when very bright or dark objects dominate a significant portion of the frame, such as early and late in the day. When there are large tonal differences throughout the scene, e.g., when very bright sky or deeply shadowed foregrounds dominate much of the frame, exposure can be biased, leading to erroneous exposure settings. These are the situations where I find spot metering to be most advantageous. Under conditions such as these, a portion of the scene's exposure may need to be compromised, or an entirely different approach taken, for example, use of a graduated neutral-density filter to even out exposure between bright sky and dark foreground, or use of multiple exposures to be combined in HDR. By all means, if there's any doubt, take a series of bracketed exposures at 1-EV/stop intervals and select the one you feel works best—pixels are cheap and you may have only one opportunity to capture that special moment.

Shooting Modes

How does shooting in Aperture or Shutter Priority or Program mode affect things? The concept is exactly the same; however, in any program mode, the camera automatically will correct exposure by adjusting aperture and/or shutter speed to render each image at neutral tonality, or 12.5% gray, regardless of how bright or dark the scene should be. As we know, unfortunately, not all scenes are neutral tone; for instance, white snow will be rendered as gray if the camera is left to its own accord, as illustrated in Figure 5. When things aren't neutral, the camera must be instructed to alter the way in which it interprets the scene, i.e., to over- or underexpose and by how much. This is termed "exposure compensation." When setting this, it's simplest to work in full-stop increments, if possible. For example, white snow may require exposure compensation to be set between +1 EV and +2 EV to be rendered correctly, depending on how brightly the scene is lit.

Likewise, for a dark scene, negative compensation, such as -1 EV for a

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Perfect Exposure

twilight scene, may be appropriate, otherwise it may be depicted as too light. A good example of a tricky situation is in Figure 5, where you have to determine whether the exposure on the bison or the snow is more important. The animal is almost always more important than the setting, and in this case, exposure compensation was dialed up to be sure to get a good rendering of the bison.

A word of caution if spot metering: Things can go awry if the image is reframed after metering, as the camera automatically will change exposure unless automatic exposure (AE) lock is engaged until the shutter release is fully activated. Evaluative metering can be more forgiving when using Aperture or Shutter Priority modes, since light or dark areas may balance each other, giving a more uniform exposure. As long as you understand and are comfortable with these limitations, things will work fine.

I find that you can hardly ever go wrong spot metering in Manual mode, and this is what I teach all of my students. Yes, you're forced to make a decision with each shot to select a shutter speed and aperture appropriate to the situation, but then isn't that what photography is all about?

Like anything else worth doing, the art of metering and setting exposure correctly requires practice. While all of this may seem a little intimidating at first, the more experience you get, you'll come to understand that it makes sense. Soon all of this will be second nature, and your photographic efforts will improve dramatically. **OP**

See more of ***Rick Sheremeta****'s photography and learn about his photo workshops at www.alpenglowproductions.com or check out his Facebook Page at www.facebook.com/AlpenGlowProductions.*

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Wildlife [On A Budget]

We look at the priorities for building a wildlife outfit that will give you the best bang for your buck

While you can photograph wildlife with any camera and lens, some gear makes doing so easier and more productive. Here, we look at the best wildlife photography gear available for a low budget, a mid-range budget and a high-end budget.

The best wildlife cameras are DSLRs because they have the best bang for the buck—the best AF systems for animal action and the widest selection of long wildlife lenses, along with excellent image quality and ease of use. Mirrorless interchangeable-lens cameras have far fewer native wildlife focal lengths available, and their AF systems don't handle quick and erratic subjects like flying birds nearly as well as DSLRs. If your wildlife ambitions lean more toward animal portraits than action, then action AF performance isn't so important, and mirrorless cameras offer the advantage of smaller bodies and lenses, easier to carry into the field where the wild things are.

The prime requirement for a wildlife lens is reach (focal length), followed closely by AF speed and accuracy. It's hard to get close enough to most wild critters to get good shots, so wildlife specialists like really long lenses—300mm is a bare minimum; most use 500mm, 600mm and even 800mm, often with teleconverters to increase the reach (see the "Teleconverter" sidebar). AF performance is a matter of both camera body and lens; those hugely expensive pro bodies and lenses really do autofocus more quickly and more accurately on action subjects than lesser gear. But, besides cost, they're much bulkier and thus more difficult to carry and handle. Two things you want in a wildlife action lens are a focusing-range limiter (so the lens doesn't have to hunt all the way down to minimum focusing distance when your subject is 100 feet away) and the ability to set focus manually while in AF mode (the AF system will acquire focus more quickly if you start with it manually "ballparked" on the subject, something you can't do quickly if you have to switch to MF mode to do it). A close minimum focusing distance is important if your wildlife subjects include insects and spiders.

A tripod can hold the camera steadier than a photographer can, especially important when using long lenses, where camera shake is magnified along with the subject's image. But with today's image stabilization—both optical in-lens and sensor-shift in-camera body—many wildlife shooters do work handheld. The important thing, if you use a tripod, is to get a sturdy one; a flimsy one won't hold the camera and lens steady. Note that because long lenses generally weigh more than a camera body, you generally mount the lens to the tripod head, rather than using the camera body's tripod socket.

To carry gear in the field, a photo backpack is the best solution; it leaves your arms free for shooting and climbing, and won't fall off as a shoulder bag might. You want a rugged one that can handle life in the wild and that can hold what you need and provide easy accessibility, preferably without having to take it off every time you need something contained therein. Of course, it depends on what you need on a particular shoot. Some bird specialists go out with camera and lens on a neckstrap, spare batteries and memory cards in their pockets, and that's it. That said, always carry spare batteries and memory cards when afield, as well as a lens-cleaning kit, a small flashlight and a hat (David Morgan makes good ones).

Entry-Level Kit

Inter

Teleconverters

A teleconverter (or tele-extender) provides a quick and cheap way to gain "reach"—attach a 1.4X converter between lens and body, and lens focal length increases 1.4X (a 300mm becomes a 420mm); attach a 2X, and focal length doubles (the 300mm becomes a 600mm). The minimum focusing distance doesn't change. Attach a 2X converter to a 300mm lens that focuses down to 5 feet, and you have a 600mm lens that focuses down to 5 feet.

There are some drawbacks, though. For one thing, teleconverters make the lens slower—a 1.4X by one stop, a 2X by two stops. Attach a 1.4X converter to a 300mm *f*/4 lens, and it becomes a 420mm *f*/5.6; attach a 2X, and the 300mm *f*/4 becomes a 600mm *f*/8. Many DSLRs won't autofocus with lens/converter combos slower than *f*/5.6, and AF performance slows even with those that will. Also, a teleconverter will reduce image quality. **A good converter used with a lens for which it's designed can deliver very good results** (many wildlife pros use converters with their pro lenses), but converters generally don't provide good results with consumer-level zooms.

mediate Kit

High-End Kit

[Entry-Level Budget] Kit

All budgets are limited, some just more so than others. An entry-level wildlife kit would include an entry-level DSLR and a 70-300mm zoom (but not a bottom-end one; those are just too slow in AF performance to do action, although they can deliver nice wildlife portraits). **Canon**'s **EOS Rebel T5i** or **EOS 60D** are good choices, with effective 9-point AF systems, 18 megapixels and a 1.6X focal-length factor (a 300mm lens on these cameras frames like a 480mm on a full-frame DSLR or 35mm film camera). **Nikon**'s **D3300** and **D5300** feature EXPEED 4 processors like the high-end Nikon DSLRs, and 11-point AF systems like the one in the D90, which we used successfully for birds-in-flight shots when we tested it when it came out back in 2008. The **Pentax K-50** and new **K-S1** feature essentially the same AF system as the original K-5, which our resident bird buff actually bought for its results and weatherproofing (the K-50 and K-S1 also have weatherproofing, albeit not quite in the K-5's class). These cameras can shoot bursts at 5 to 6 fps, with AF for each frame.

For a budget wildlife lens, you're most likely looking at a 70-300mm zoom. Good ones include **Canon**'s **EF 70-300mm ƒ/4-5.6 IS USM**, **Nikon**'s **AF-S VR 70-300mm ƒ/4.5-5.6G IF-ED**, **Pentax**'s **HD DA 55-300mm ƒ/4-5.8 ED WR** (which complements the camera bodies' weather resistance) and **Sony**'s **70-300mm ƒ/4.5-5.6G SSM** (either the original version or II version, although now you're getting up over $1,000). **Tamron**'s **SP 70-300mm ƒ/4-5.6 Di VC USD**, like the Canon and Nikon 70-300s, has built-in image stabilization, and is available in mounts for Canon, Nikon and Sony DSLRs. (Pentax and Sony DSLRs have in-camera sensor-shift stabilization, so you get stabilization with any lens attached to these cameras.)

Around the $1,000 mark, you even can get a big zoom range: **Sigma**'s **120-400mm ƒ/4.5-5.6 DG APO OS HSM** and **150-500mm ƒ/5-6.3 APO DG OS HSM** and **Tamron**'s recent **SP 150-600mm ƒ/5-6.3 Di VC USD** all feature built-in stabilization and lots of reach, and surprisingly good performance for the price. Note that these big guns weigh around four pounds, not as huge as the pro superteles, but they're no lightweights.

These zooms are all slower at their longest focal length than at their shortest. This "variable-aperture" design keeps costs down and makes for more compact lenses, but means the lens gets slower as it gets longer, a drawback if shooting in dimmer light.

A good tripod is beyond an entry-level budget, so you can either work handheld and make do with the lens or camera stabilization, or get a good monopod. The **Sirui P-S photo/video monopod** features three fold-down feet for added stability, 360° panning head, and can tilt 20° in any direction with adjustable drag. It's available in aluminum and carbon-fiber; the latter costs $100 more, but is lighter and more rugged (and more comfortable to grip when very cold or hot).

As far as a bag and accessories, as this is low budget, you can make do with just your camera body and long lens, and a support. You may want to splurge on a shoulder strap like the **BlackRapid Kick**, rather than use the neckstrap that came with the camera; it's more comfortable than the neckstrap with a heavy lens. If you carry your camera with long lens using a neckstrap, support the lens with a hand as you walk; letting the unit hang as you walk can stress the camera mount. And, if you use a shoulder strap that has the camera hang upside down, attach it to the lens' tripod mount, which is generally pretty rugged, rather than the camera's tripod mount, which wasn't designed to support the weights of a hanging camera and heavy lens. Filters aren't as important for wildlife as for landscapes, but a spare battery and memory card or two are always a good idea when in the field, as is an air blower and lens-cleaning kit like **Hoodman**'s **Lens Cleanse**.

[Intermediate-Budget Kit]

Here, we have some excellent wildlife cameras and lenses. **Canon**'s **EOS 7D Mark II** (and even the original **EOS 7D**, which sells for about half the Mark II's price these days), **Nikon**'s **D7100** (and semi-discontinued-but-still-available **D300S**) and **Pentax**'s **K-3** deliver image quality and performance. The newish 20.2-megapixel EOS 7D Mark II is Canon's top APS-C DSLR. The APS-C Pentax K-3 has 24.3 megapixels, and the Nikon D7100 has 24.1 megapixels. The D7100 features essentially an APS-C version of the 51-point AF system in Nikon's flagship D4, and the Pentax K-3 has a 27-point system that's a bit slower, but can still handle birds in flight; the EOS 7D Mark II features the best AF system ever in a Canon DSLR. **Sony**'s 24.3-megapixel **SLT-A77 Mark II** can shoot 12 fps with phase-detection AF for each frame (albeit with no live view in the EVF at that speed) and provides continuous phase-detection AF with eye-level viewing for video—the best choice for birds-in-flight videos. The Nikon D7100 can shoot up to 6 fps, the original Canon EOS 7D, 8, the Pentax K-3, 8.3, and the new Canon EOS 7D Mark II, 10 fps—all with AF for each frame. **Sigma**'s **SD1 Merrill** isn't as quick as these DSLRs, but offers the unique Foveon X3 image sensor, and can deliver excellent detailed animal portraits.

In the intermediate category, there are some wildlife-suitable mirrorless cameras. The **Fujifilm X-T1, Olympus OM-D E-M1, Panasonic LUMIX DMC-GH4, Samsung NX1** and **Sony a7 series** look like small DSLRs—and deliver DSLR image quality. Their drawbacks are lack of long native lenses and AF performance (mainly noticed in birds-in-flight work). Of course, due to their short flange-back distances, these cameras can use a wide variety of non-native lenses via adapter. You lose AF when doing that, but you can greatly expand your pool of usable focal lengths. Sony makes adapters that enable you to use Sony A-mount and legacy Konica Minolta Maxxum DSLR lenses on their mirrorless cameras, with phase-detection AF (a PDAF system much like that in their SLT DSLRs is built into the adapter).

With an intermediate budget, you can get lenses that autofocus noticeably faster than the entry-level ones. **Canon, Nikon** and **Pentax** offer excellent **300mm ƒ/4**s. **Nikon** introduced a **VR (stabilized) 300mm ƒ/4**. **Canon**'s **EF 400mm ƒ/5.6 IS USM** is a great good-light birds-in-flight lens. It's a bit slow at ƒ/5.6 and lacks a stabilizer, meaning you need light, but it autofocuses quickly and accurately, and no one else offers a 400mm prime lens near its price. In zooms, choose among **Canon**'s **EF 100-400mm ƒ/4.5-5.6L IS USM**, original or new II, **Sony**'s **70-400mm ƒ/4-5.6 G**, original or II (in both cases, the II version is better and costs more), and **Nikon**'s original **AF 80-400mm ƒ/4.5-5.6D** (the new AF-S version has much better AF and optical performance, but costs $2,700).

On a moderate budget, you can buy a good tripod. Carbon-fiber units are light, yet sturdy. **Adorama, Gitzo, Manfrotto, Really Right Stuff, Slik** and others offer a selection of good carbon-fiber tripods. Check them out online, then try the ones that appeal to you at your local camera shop—usability is a big consideration with a tripod, and you can't determine that online.

If you plan to do mainly animal portraits, a ballhead is ideal, as it lets you position the camera as desired, then lock it there with the twist of a single knob. If you do birds in flight, a gimbal head lets you track the bird while providing good support (and also will lock down for stationary portrait shots).

On an intermediate budget, you can afford faster memory cards—a good choice, as the recommended DSLRs feature 18 to 24 megapixels and quick shooting capability. Consider camouflage coverings for your lenses such as those from **LensCoat**. While animals probably will know you're there, they look cool, and more importantly, provide some ding protection, and the **RainCoat 2**, rain protection.

(Cont'd on page 96)

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Irene Hinke-Sacilotto

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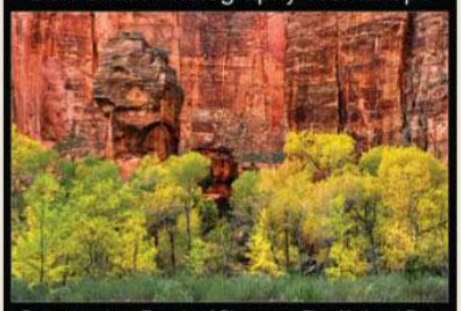

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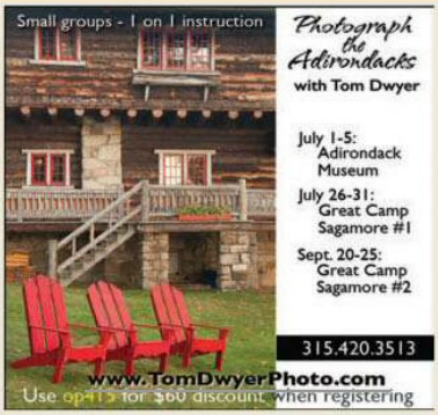

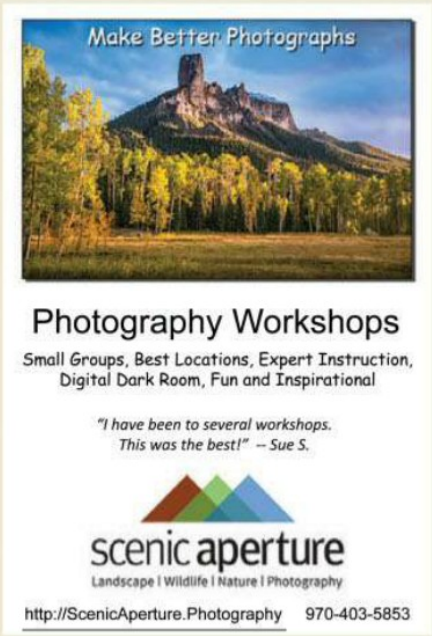

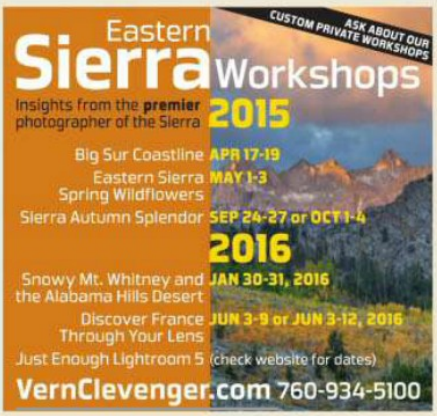

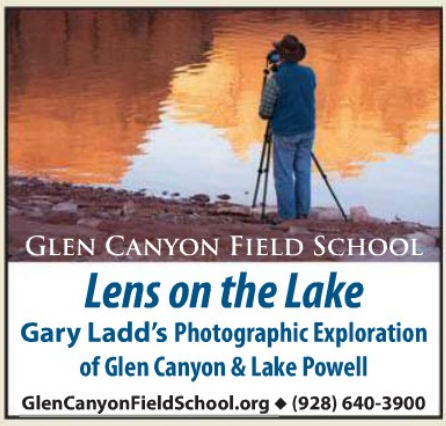

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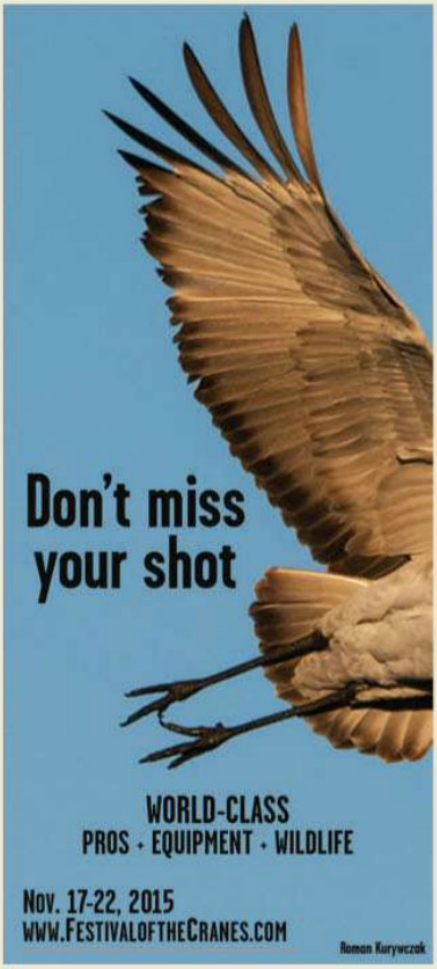

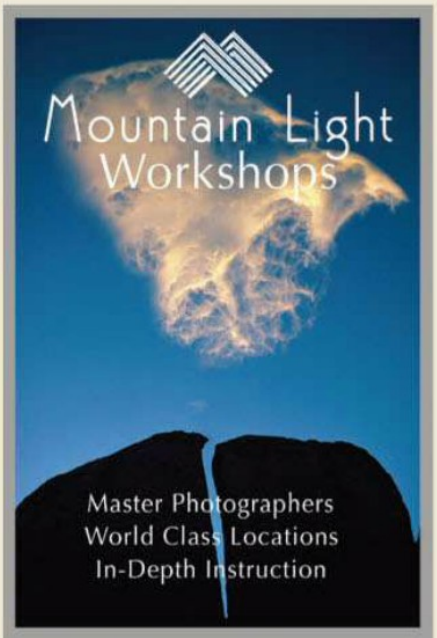

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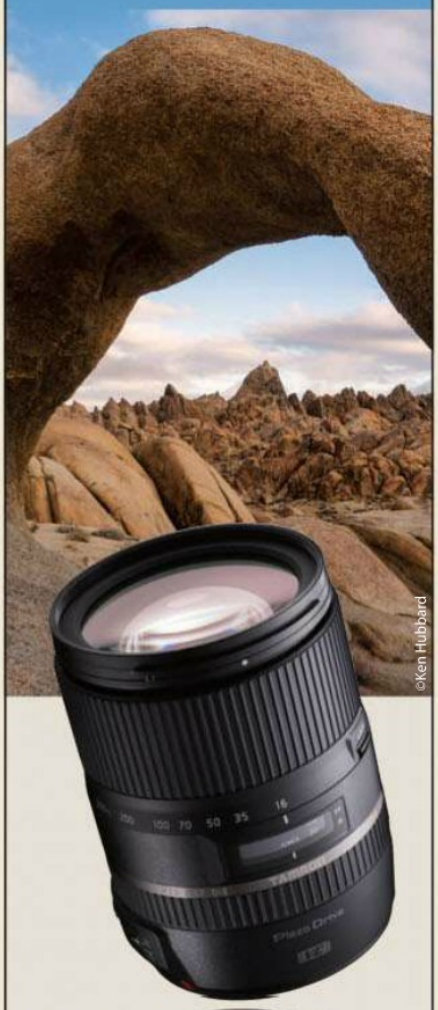

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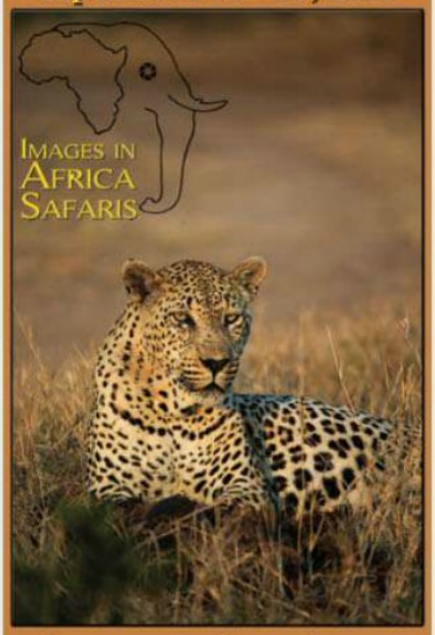

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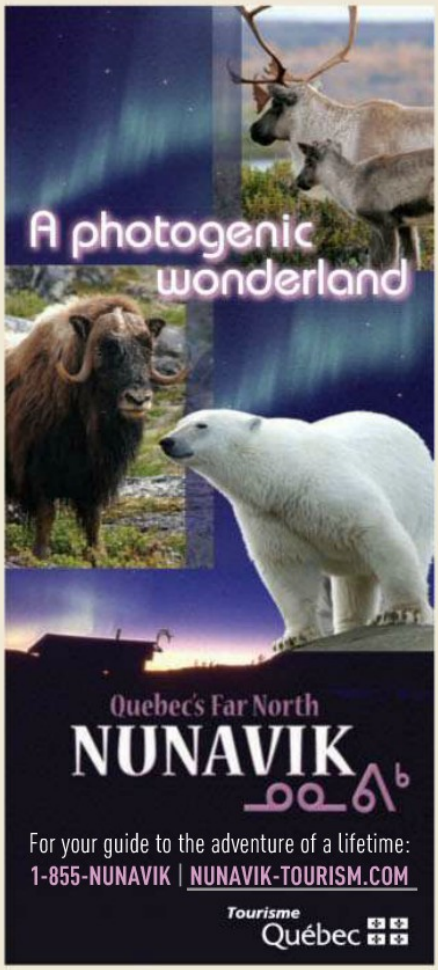

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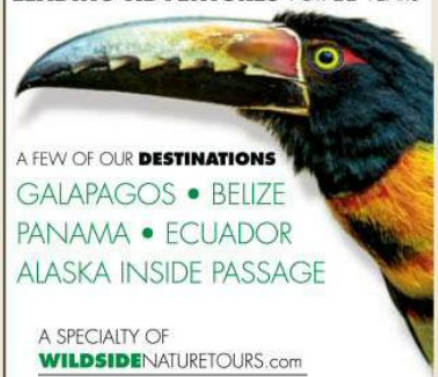

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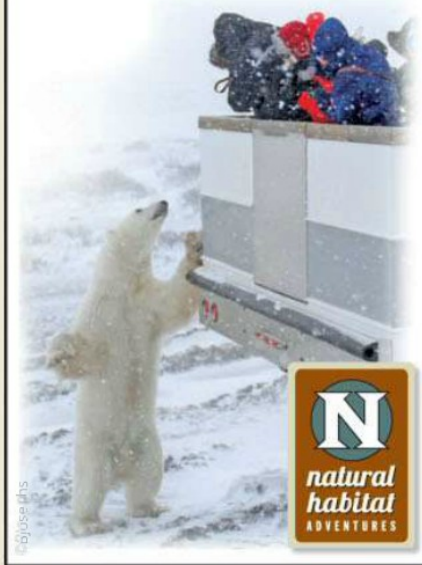

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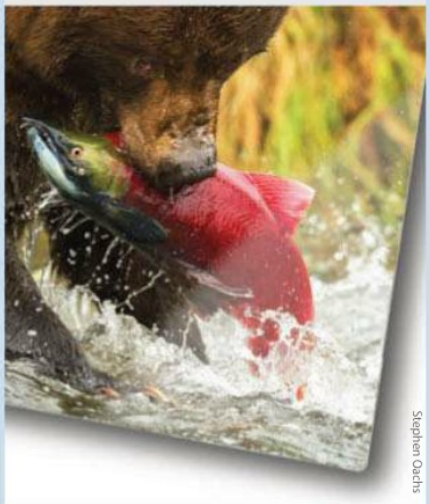

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Wildlife photographers need long lenses because it's usually difficult to get close enough to wild animals to get good shots (and sometimes dangerous to try to do so). If they want to photograph wildlife in motion, especially birds in flight, they also need excellent AF performance. Today, we have a range of long lenses to suit many budgets. The newer consumer supertelephoto zooms are surprisingly good, allowing one to get a quality lens that goes out to 400mm, 500mm and even 600mm.

But the ultimate wildlife lenses are the pro big guns: the **300mm ƒ/2.8, 400mm ƒ/2.8, 500mm ƒ/4, 600mm ƒ/4** and **800mm ƒ/5.6**, the **200-400mm ƒ/4 zooms** from **Canon** and **Nikon**, and **Sigma**'s **300-800mm ƒ/5.6 zoom**. These bulky, costly beasts feature the best optical designs and glass, the best AF systems and the most rugged construction, and are the standbys of wildlife pros throughout the world.

On the downside, these big guns are a bit unwieldy, although we do know a few who handhold them for bird-in-flight shots (far more use them on tripods with gimbal heads, though). If you're used to handholding **Canon**'s **EF 400mm ƒ/5.6** (2.8 pounds) and think buying the **EF 400mm ƒ/2.8** (8.5 pounds) will automatically get you better animal action shots, it won't, at first. Shooting with the big lens is a lot different than shooting with the light one, and requires different techniques (and, preferably, a tripod). But once you master it, the 400mm ƒ/2.8 will deliver better images due to its better optics and AF performance.

When you start using really long lenses, be aware that the field of view is quite narrow, making it hard to find the subject when you bring the camera up to your eye. Even if you're used to using a shorter telephoto lens, like a 70-300mm consumer zoom, when you buy a 600mm big gun (or even the much lighter 4.3-pound **Tamron SP 150-600mm supertele zoom**), there will be a big learning curve: A 600mm lens has half the field of view of a 300mm, and it will be difficult to even find the subject the first several times you use the longer lens. The zoom actually offers a big advantage here, in that you can zoom to the widest focal length to acquire the subject, then zoom in on it.

Zoom Or Prime?

Zoom lenses offer the advantage of a whole range of focal lengths in a single unit. With a 70-300mm zoom, you get 70mm, 85mm, 100mm, 135mm, 200mm and 300mm, and all the focal lengths in between. This can save a lot of cost and bulk in obtaining and carrying several prime lenses, and lets you change focal length with the twist of a wrist—much quicker than physically changing lenses, and avoiding dust on the image sensor from multiple lens changes. If you're so inclined, you can also zoom a zoom lens during a long exposure to produce an interesting "explosion" effect.

Prime lenses are sharper than zoom lenses and generally faster, although the fastest 500mm lens is **Sigma**'s $25,999 **200-500mm ƒ/2.8**. It's easier to correct all the possible aberrations and distortions and other lens flaws for a single focal length than for a whole range of focal lengths. That said, many fine wildlife shots have been made with pro zooms—image quality may not match a pro supertele prime, but it can still be very good.

Sigma's $25,999 200-500mm ƒ/2.8 notwithstanding, the fastest zoom lenses that go out to 400mm have a maximum aperture of ƒ/4, and **Canon** and **Nikon** both offer **400mm ƒ/2.8 primes**. The fastest zooms to go to 500mm (excluding the aforementioned Sigma 200-500mm) have maximum apertures of ƒ/6.3 at 500mm, while **Canon, Nikon** and **Sony** offer **500mm ƒ/4 lenses**, and **Sigma** has a **500mm ƒ/4.5**. The zooms that go to 600mm also have a maximum aperture of ƒ/6.3 at that focal length, while **Canon** and **Nikon** offer **600mm ƒ/4 primes**. If you like to shoot in dim light (dawn and dusk, for example), the faster primes will let you use a lower ISO or a faster shutter speed.

Zooms offer an advantage when you need reach and are on a budget. The lowest-priced 500mm prime lens (excluding cheapie mirrors) costs $500, while there are a number of good supertele zooms that go out to 500mm and even 600mm for under $2,000, several closer to $1,000.

Variable-Aperture Or Fixed?

In general, lower-priced zoom lenses change aperture as they're zoomed; they have a larger maximum aperture at the shortest focal length and a slower one at the longest focal length. For example, the **Tamron SP 70-300mm ƒ/4-5.6** has a maximum aperture of ƒ/4 at 70mm and a maximum aperture of ƒ/5.6 at 300mm (and, yes, this full-stop difference extends through the aperture range; the minimum aperture is ƒ/32 at 70mm and ƒ/45 at 300mm).

Higher-end zooms generally maintain a constant aperture throughout the zoom range. **Sigma**'s **300-800mm ƒ/5.6** has a maximum aperture of ƒ/5.6 at 300mm, 800mm and everywhere in between.

Ironically, the "constant-aperture" zoom actually has to change the diameter of its aperture as the lens is zoomed to maintain a constant ƒ-number throughout, while a "variable-aperture" zoom can maintain a constant-aperture diameter throughout the zoom range (which would account for the change in ƒ-number as it zooms, the ƒ-number being the ratio between the focal length and the diameter of the entrance pupil (the apparent size of the aperture opening as viewed through the front of the lens).

Letting the ƒ-number change as the lens is zoomed allows designers to create more

A Selection Of Top Wildlife Lenses

	Elements/ Groups	Max. MFD	Filter Magnif.	Size	Dimensions	Weight	Street Price	Mounts
For Full-Frame (can also be used on APS-C)								
Canon EF 300mm *f*/2.8L IS II USM	16/12	6.6 ft.	0.18X	52mm*	5.0x9.8 in.	5.2 lbs.	$7,299	Ca
Nikon AF-S 300mm *f*/2.8G ED VR II	11/8	7.5 ft.	0.16X	52mm*	4.9x10.5 in.	6.4 lbs.	$5,899	Ni
Nikon AF-S 300mm *f*/4E PF ED VR	16/10	4.6 ft.	0.24X	77mm	3.5x5.8 in.	1.7 lbs.	$1,999	Ni
Sigma 300mm *f*/2.8 EX APO DG (HSM)	11/9	8.2 ft.	0.13X	46mm*	4.7x8.4 in.	5.3 lbs.	$3,399	CaNiPeSiSo
Sony 300mm *f*/2.8 G SSM II	13/12	6.7 ft.	0.18X	42mm*	4.8x9.5 in.	5.2 lbs.	$7,399	So
Canon EF 300mm *f*/4L IS USM	15/11	4.9 ft.	0.24X	77mm	3.5x8.7 in.	2.6 lbs.	$1,449	Ca
Nikon AF-S 300mm *f*/4D IF-ED	10/6	4.8 ft.	0.27X	77mm	3.5x8.8 in.	3.2 lbs.	$1,494	Ni
Canon EF 200-400mm *f*/4L IS USM Extender 1.4x	25/20	6.6 ft.	0.15X	52mm*	5.0x14.4 in.	8.0 lbs.	$11,799	Ca
Nikon AF-S 200-400mm *f*/4G ED VR II	24/17	6.6 ft.	0.27X	52mm	4.9x14.4 in.	7.4 lbs.	$6,999	Ni
Canon EF 400mm *f*/2.8L IS II USM	16/12	8.9 ft.	0.17X	52mm*	6.4x13.5 in.	8.5 lbs.	$11,499	Ca
Nikon AF-S 400mm *f*/2.8E FL ED VR	16/12	8.5 ft.	0.16X	40.5mm*	6.3x14.1 in.	8.4 lbs	$11,999	Ni
Nikon AF-S 400mm *f*/2.8G ED VR	14/11	9.5 ft.	0.16X	52mm*	6.3x14.5 in.	10.2 lbs.	$9,549	Ni
Canon EF 400mm *f*/4 DO IS USM	17/13	11.5 ft.	0.12X	52mm*	5.0x9.2 in.	4.3 lbs.	$6,469	Ca
Canon EF 400mm *f*/5.6L USM	7/6	11.5 ft.	0.12X	77mm	3.5x10.1 in.	2.8 lbs.	$1,339	Ca
Canon EF 500mm *f*/4L IS II USM	18/12	12.1 ft.	0.15X	52mm*	5.7x15.1 in.	7.0 lbs.	$10,499	Ca
Nikon AF-S 500mm *f*/4G ED VR	14/11	12.6 ft.	0.14X	52mm*	5.5x15.4 in.	8.6 lbs	$8,579	Ni
Sony 500mm *f*/4 G SSM	11/10	13.2 ft.	0.14X	42mm*	5.5x14.5 in.	7.6 lbs.	$12,899	So
Sigma 500mm *f*/4.5 EX DG APO (HSM)	11/8	13.1 ft.	0.13X	46mm*	4.8x13.8 in.	6.9 lbs.	$4,999	CaNiPeSiSo
Canon EF 600mm *f*/4L IS II USM	16/12	14.8 ft.	0.15X	52mm*	6.6x17.6 in.	8.6 lbs.	$12,999	Ca
Nikon AF-S 600mm *f*/4G ED VR	15/12	15.7 ft.	0.14X	52mm*	6.5x17.5 in.	11.2 lbs	$10,299	Ni
Canon EF 800mm *f*/5.6L IS USM	18/14	19.7 ft.	0.14X	52mm*	6.4x18.1 in.	9.9 lbs.	$13,999	Ca
Nikon AF-S 800mm *f*/5.6E FL ED VR	20/13	19.4 ft.	0.15X	52mm*	6.3x18.2 in.	10.1 lbs.	$17,899	Ni
Sigma 800mm *f*/5.6 EX APO DG HSM	12/9	23.0 ft.	0.11X	46mm*	6.2x20.5 in.	10.8 lbs.	$6,599	CaNiSi
Sigma 300-800mm *f*/5.6 EX DG APO HSM	18/16	19.7 ft.	0.14X	46mm*	6.2x21.3 in.	12.9 lbs.	$7,999	CaNiSi
For APS-C (1.5X focal-length factor)								
Pentax DA* 300mm *f*/4 ED(IF) SDM	8/6	4.6 ft.	0.24X	77mm	3.3x7.2 in.	2.4 lbs.	$1,399	Pe
Pentax HD DA 560mm *f*/5.6 ED AW	6/5	18.4 ft.	0.10X	112mm	5.1x20.5 in.	6.7 lbs.	$6,999	Pe
For Micro Four Thirds (2.0X focal-length factor)								
Olympus M.Zuiko ED 40-150mm *f*/2.8 PRO	16/10	2.3 ft.	0.21X	72mm	3.1x6.3 in.	1.9 lbs.	$1,499	MFT

* Rear drop-in filter
Mounts: Ca = Canon EF; Ni = Nikon F; Pe = Pentax K; Si = Sigma SA; So = Sony (and Konica Minolta) A; MFT = Micro Four Thirds

compact and less costly zooms. Built-in TTL metering automatically compensates for the change so, in practice, the main consideration is that variable-aperture zooms get slower as they get longer. Since lenses are generally sharpest when closed down a stop or two from wide open, this can be a disadvantage in dim light, as you'll have to use a slower shutter speed or a higher ISO setting, both of which can have a negative effect on image quality. That said, though, lots of great wildlife images have been made with variable-aperture zooms.

Weight

Faster lenses are bigger than slower ones—larger in diameter and much heavier. **Canon**'s **300mm *f*/4 IS** measures 3.5x8.7 inches and weighs 2.6 pounds, while their **300mm *f*/2.8 IS** measures 5.0x9.8 inches and weighs 5.2 pounds. Those 2.6 pounds are easily handholdable for most photographers, while 5.2 pounds is not. Fast lenses let you shoot at a lower ISO or faster shutter speed in a given light level, and being pro lenses, offer better optical and AF performance. But they're also much bulkier and more costly. Pros and serious amateurs who can afford them generally go for the big guns for the better performance, but many (especially those who prefer to work handheld or have limited budgets) are quite happy with slower lenses.

All-out pro lenses also tend to be bulky, mostly because of more rugged construction and better glass. **Tamron**'s **SP 150-600mm *f*/5-6.2 supertele zoom** measures 4.2x10.2 inches and weighs 4.3 pounds, while **Canon**'s **600mm *f*/4 supertele** measures 6.6x17.6 inches and weighs 8.6 pounds, and **Nikon**'s **AF-S 600mm *f*/4G** measures 6.5x17.5 inches and weighs 11.2 pounds. Again, the consumer zoom doesn't match the optical and AF performance of the pro primes, but it's much more compact—and costs one-tenth as much.

Camera Format

A lens field of view depends on its focal length and the size of the sensor in the camera. A 300mm lens has an angle of view (measured diagonally) of about 8° on a full-frame DSLR, about 6° on an APS-C DSLR and about 4° on a Micro Four Thirds mirrorless camera. Since photographers generally think in terms of focal length rather than field of view, this means a 300mm lens on an APS-C camera frames like a 450mm lens on a full-frame DSLR, and on an MFT camera, frames like a 600mm lens on a full-frame DSLR. You put that Tamron or Sigma 150-600mm lens on an APS-C body and zoom out to 600mm, and you get the framing you'd get with a 900mm lens on a full-frame camera.

Field of view is something to keep in mind if you're used to using a compact zoom. As mentioned, a 600mm big gun will have a big learning curve. That 600mm lens has half the field of view of a 300mm, and it will be difficult to even find the subject (especially a small bird) the first several times you use the longer lens. OP

Supertele Zooms

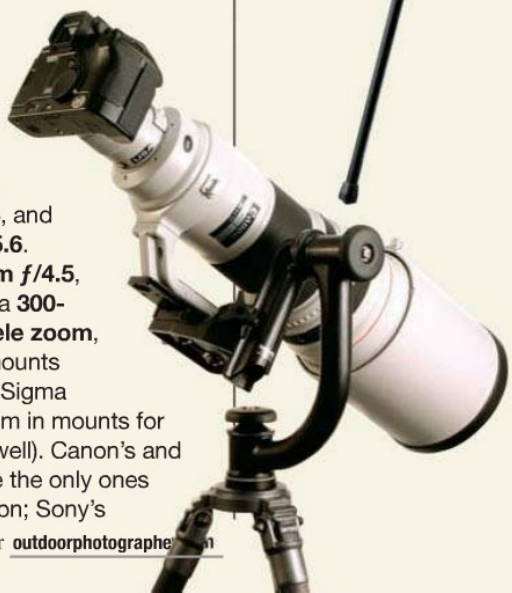
Three recent supertele zooms, while not in the "ultimate big-gun" category, are of interest to serious wildlife photographers. **Tamron**'s **SP 150-600mm *f*/5-6.3** offers surprisingly good image quality and AF performance, relatively light weight (4.3 pounds) and built-in Vibration Compensation—for $1,069! **Sigma**'s **pro-oriented 150-600mm *f*/5-6.3 Sports lens** features rugged weatherproof construction and presumably excellent performance (we haven't tested it yet) for $1,999. **Canon**'s long-awaited successor to the original EF 100-400mm *f*/4.5-5.6L, the **EF 100-400mm *f*/4.5-5.6L IS II USM** includes optical, AF performance and image-stabilizing improvements for $2,199. All are good options for wildlife photographers who need lots of reach, but don't have the budget for the pro big guns.

(Cont'd from page 83)

[High-Budget] Kit

Now you have the best of the best: pro full-frame DSLRs. **Canon**'s 18.1-megapixel **EOS-1D X** and **Nikon**'s 16.2-megapixel **D4S** are the companies' flagship models, able to shoot long bursts at over 10 fps with excellent AF, terrific high-ISO performance, very rugged bodies and long battery life. Most serious bird photographers with big budgets use them. Less costly, but still excellent alternatives include **Canon**'s **EOS 5D Mark III** (22.3 megapixels and essentially the same AF system as the EOS-1D X, but "only" 6 fps) and **Nikon**'s **D810** (36.3 megapixels and essentially the same AF system as the D4S, including the excellent Group Area AF and 5 fps) and **D750** (24.3 megapixels, more "reach" than the D4S and essentially the same AF system and 6.5 fps at a far lower price).

With a high budget, you can buy the pro "big-gun" lenses: 300mm *f*/2.8, 400mm *f*/2.8, 500mm *f*/4, 600mm *f*/4, 800mm *f*/5.6 and pro 200-400mm *f*/4 zoom. These are the lenses used by most wildlife pros, and with good reason: They offer the best optical quality, the best AF performance and the most rugged construction. They're also really bulky and difficult to handhold successfully despite their built-in stabilization (although we know photographers who do it). Canon and Nikon offer all of the above-cited focal lengths, while **Sony** offers a **300mm *f*/2.8** and **500mm *f*/4**, and **Pentax**, a **560mm *f*/5.6**. **Sigma** offers a **500mm *f*/4.5**, an **800mm *f*/5.6** and a **300-800mm *f*/5.6 supertele zoom**, all three available in mounts for Canon, Nikon and Sigma DSLRs (and the 500mm in mounts for Pentax and Sony, as well). Canon's and Nikon's "big guns" are the only ones with built-in stabilization; Sony's current SLT cameras have sensor-shift stabilization in the camera body.



A high budget lets you buy a top tripod. The **Gitzo Ocean Systematic Series 5** can handle extreme conditions, and **Gitzo**'s **GT55422S** is popular with long-lens bird photographers. Other good high-end tripods are available from **Manfrotto, Really Right Stuff** and **Slik**. Of course, you don't have to buy the most expensive tripod; get one that's sturdy and stable enough to support your camera and long lens(es), but light enough to carry where you'll want it. **Acratech, Arca-Swiss, Kirk** and **Really Right Stuff** offer excellent ballheads, while top gimbal heads (ideal for birds in flight) are available from **Induro, Jobu, Kirk, Manfrotto, Mongoose, Sirui** and **Wimberley**. Note that gimbal heads require lens-mounting plates; you'll need one for each of your lens(es).

You can buy a top photo backpack with a high budget. Good ones are offered by **Gura Gear (Bataflae 322)**, **Lowepro (Pro Trekker 650 AW)** and **Think Tank Photo (Shape Shifter)**, among others. OP

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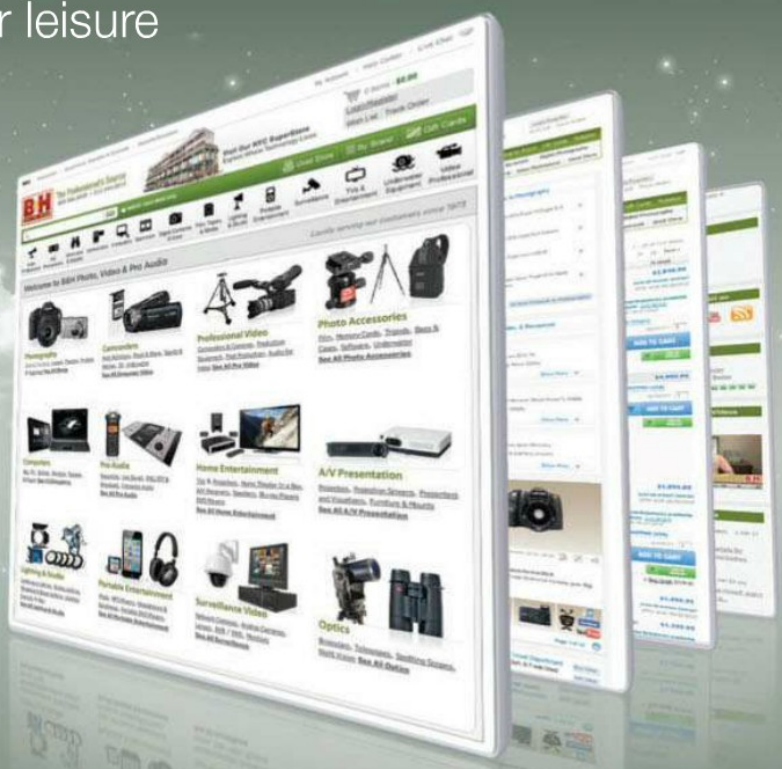

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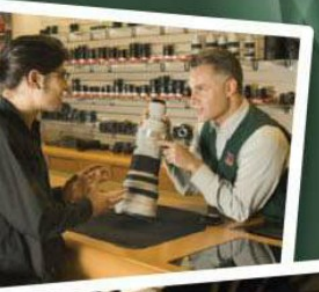

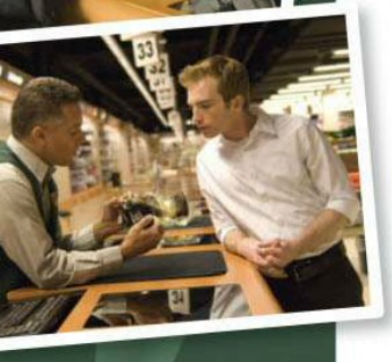

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Nikon

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16/2.4 Pancake	CALL	45/1.8	CALL
20/2.8 Pancake	CALL	45/1.8 [T6] 2D/3D	CALL
60/2.8 Macro ED OIS SSA			CALL
85/1.4 ED SSA	CALL	18-55/3.5-5.6 OIS	CALL
12-24/4-5.6 E	CALL	18-200/3.5-6.3 ED OIS	CALL
16-50/3.5-5.6 ED OIS	CALL	20-50/3.5-5.6 ED II	CALL
16-50/2-2.8 S ED OIS	CALL	50-200/4-5.6 ED OIS II	CALL

Panasonic

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14-42/3.5-5.6 X PZ Power OIS (Silver)			316.00
14-45/3.5-5.6 Aspherical Mega OIS			289.00
14-140/4.0-5.8 HD Aspherical Mega OIS			429.95
14-140/3.5-5.6 Aspherical Power OIS			560.49
45-150/4-5.6 Asph.	249.00	45-200/4-5.6 OIS	269.00
45-175/4-5.6 X OIS	379.00	100-300/4.0-5.6 OIS	597.99

OLYMPUS

Flash System

FL-300R Flash	136.95	RF-11 Ring Flash	249.95
FL-600R Flash	299.95	SRF-11 Ring Set	559.95
FL-50R Flash	499.95	TF-22 Twin Flash	449.95
STF-22 Twin Flash Set			739.95

M.Zuiko Micro 4/3 Mirrorless Lenses

9mm f/8.0 Fisheye Body Cap Lens			99.00
15mm f/8.0 Fisheye Body Cap Lens			49.00
12/2.0 (46ø)	799.00	45/1.8 (37ø)	399.00
17/2.8 (37ø)	299.00	60/2.8 Mac ED (46ø)	499.00
17/1.8 (46ø)	499.00	75/1.8 ED (58ø)	899.00
25/1.8 (46ø)	399.00	9-18/4.0-5.6 (52ø)	699.00
12-40/2.8 Pro ED (62ø)			999.00
12-50/3.5-6.3 ED EZ (52ø)			499.00
14-42/3.5-5.6 EZ ED (37ø)			349.00
14-42/3.5-5.6 II R (37ø)			299.00
14-150/4-5.6 (58ø)			599.00
40-150/4-5.6 ED R (58ø)			199.00
75-300/4.8-6.7 II ED (58ø)			549.00

PENTAX

AF Flash System

AF-360FGZ		AF-540FGZ II	

DA Digital AF Lenses

15/4.0 ED AL HD Limited (49ø)			
14/2.8 ED IF (77ø)		35/2 AL (49ø)	
21/3.2 AL Limited (49ø)		40/2.8 Limited (49ø)	
35/2.8 Macro HD Limited (49ø)			
40/2.8 HD Limited (49ø)		560/5.6 ED AW (112ø)	
50/1.8 (52ø)		10-17/3.5-4.5 ED IF (77ø)	
55/1.4 SDM (58ø)		12-24/4 ED AL IF (77ø)	
70/2.4 HD Limited (49ø)		16-50/2.8 ED AL SDM (77ø)	
200/2.8 ED IF SDM		17-70/4.0 AL IF SDM (67ø)	
300/4.0 ED IF SDM (77ø)		18-55/3.5-5.6 AL WR (52ø)	
18-135/3.5-5.6 ED AL (IF) DC WR (62ø)			
18-270/3.5-6.3 ED SDM (62ø)			
20-40/2.8-4 HD Limited ED DC WR (55ø)			
50-135/2.8 ED SDM (67ø)		50-200/4-5.6 ED WR (52ø)	
55-300/4-5.8 HD ED WR (58ø)			
60-250/4.0 ED IF SDM (67ø)			

"FA" AF Lenses for 35mm & Digital SLRs

31/1.8 Limited		50/1.4 (49ø)	
35/2.4 AL (49ø)		50/2.8 Macro (52ø)	
43/1.9 Limited (49ø)		77/1.8 Limited (49ø)	
100/2.8 D FA WR Macro (49ø)			

SONY

Flash System

HVL-F20M	149.99	20/2.8 (49ø)	348.00
HVL-F20S	149.99	24/1.8 (49ø)	1,098.00
HVL-F43M	398.00	30/3.5 Mac (49ø)	278.00
HVL-F60M	548.00	35/1.8 OSS (49ø)	448.00
E-Mount Mirrorless Lenses		35/2.8 ZA (49ø)	798.00
		50/1.8 OSS (49ø)	298.00
16/2.8 (49ø)	248.00	55/1.8 ZA FE (49ø)	998.00
10-18/4 OSS (62ø)			848.00
16-50/3.5-5.6 OSS (40.5ø)			348.00
16-70/4 ZA OSS (55ø)			998.00
18-55/3.5-5.6 (49ø)			298.00
18-105/4 G OSS (72ø)			598.00
18-200/3.5-6.3 (67ø)			898.00
18-200/3.5-6.3 OSS (62ø)			848.00
18-200/3.5-6.3 PZ OSS (67ø)			1,198.00
24-70/4 ZA OSS (67ø)			1,198.00
28-70/3.5-5.6 OSS (55ø)			498.00
55-210/4.5-6.3 OSS (49ø)			348.00
70-200/4.0 G OSS (72ø)			1,498.00

Digital Lenses

16/2.8 Fish-eye	998.00	20/2.8 (72ø)	748.00
24/2 Carl Zeiss (72ø)			1,398.00
30/2.8 DT Macro (49ø)			198.00
35/1.4 G (55ø)	1,498.00	50/1.8 DT (49ø)	168.00
35/1.8 DT (55ø)	218.00	50/1.4 (55ø)	448.00
50/1.4 Carl Zeiss ZA (72ø)			1,498.00
50/2.8 Mac (55ø)	598.00	85/2.8 (55ø)	298.00
85/1.4 Carl Zeiss (72ø)			1,698.00
100/2.8 Macro (55ø)			798.00
135/1.8 Carl Zeiss (77ø)			1,798.00
135/2.8 STF (72ø)			1,398.00
300/2.8 G APO II (42øR)			7,498.99
500/4 G (42øR)			12,998.00
11-18/4.5-5.6 DT (77ø)			798.00
16-35/2.8 ZA SSM (77ø)			1,998.00
16-50/2.8 DT (40.5ø)			798.00
16-80/3.5-4.5 DT (62ø)			998.00
16-105/3.5-5.6 DT (62ø)			698.00
18-55/3.5-5.6 DT SAM II (55ø)			218.00
18-135/3.5-5.6 (62ø)			498.00
18-250/3.5-6.3 DT (62ø)			648.00
24-70/2.8 Carl Zeiss (77ø)			1,998.00
28-75/2.8 (67ø)			898.00
55-200/4.0-5.6 DT (55ø)			198.00
55-300/4.5-5.6 DT (62ø)			298.00
70-200/2.8 G SSM II (77ø)			2,998.00
70-300/4.5-5.6 G (62ø)			998.00
70-400/4-5.6 G2			2,198.00
1.4x Teleconverter	548.00	2x Teleconverter	548.00

Panasonic Lumix DMC-GM1 Mirrorless System Camera

- Venus Engine Image Processor • Micro 4/3 System
- 3.0" Touchscreen LCD • SDHC/SDXC Card Slot
- Full HD 1080i AVCHD Video at 60 fps • ISO 25600
- 5 fps Continuous Shooting • Built-In Wireless
- Highly Compact Magnesium Alloy Body
- Available in Black or Orange

with 12-32mm Lens *#PADMCGM1**

16 Mega Pixels

Panasonic Lumix DMC-GX7 Mirrorless System Camera

- Micro 4/3 System • 3.0" Tilting LCD Touchscreen
- SDHC/SDXC Card Slot • 90° Tilting EVF
- Full HD 1080p AVCHD Video at 60 fps
- Focus Peaking and Magnification Windows
- Built-In Wireless and NFC Connectivity
- Available in Black or Silver

with 14-42mm II Lens *#PADMCGX7K**

16 Mega Pixels

Panasonic Lumix DMC-GH4 4K Mirrorless System Camera

- DCI 4K 4096x2160 at 24p • Full HD up to 60p
- UHD 4K 3840x2160 at 30p/24p • 3.0" LCD
- Live View Finder • High-Speed 49-Point AF
- 4:2:2 8-Bit or 10-Bit HDMI Output
- Support for 59.94p, 23.98p, 50p, & 24p
- Magnesium Alloy, Weather-Sealed Body

Body Only *#PADMCGH4**

4K 16 Mega Pixels

PENTAX K-3 DSLR Camera

- PRIME III Image Processor • 3.2" LCD
- Pentax K Lens Mount • Dual SD Card Slots
- In-Camera Shake Reduction Stabilization
- Full HD 1080i/p Video Recording
- Continuous Shooting up to 8.3 fps
- Weather-Sealed Magnesium Alloy Body

Body Only *#PEK3*

23 Mega Pixels

SONY Alpha A6000 Mirrorless System Camera

- 3.0" Tilting LCD • Uses Sony E-mount Lenses
- SDHC, SDXC, MS Pro Duo, MS PRO HG Duo Card Slot • Up to 11 fps Shooting • ISO 25600
- Full HD 1080i/p AVCHD Video at 24/60 fps
- Built-In Wi-Fi Connectivity with NFC
- Available in Black or Silver

Kit with 16-50mm OSS Lens *#SOA6000**

24 Mega Pixels

SONY Alpha A7 Mirrorless System Camera

- Full Frame Exmor CMOS Sensor • 3.0" Tiltable LCD
- SDHC, SDXC, MS Pro Duo, MS PRO HG Duo Card Slot • Uses Sony E-mount Lenses
- Built-In Wi-Fi and NFC • Direct Access Interface
- Full 1080/60p with Uncompressed Output

Body Only *#SOA7B*
Kit with 28-70mm Lens *#SOA7KB*

24 Mega Pixels

SONY Alpha SLT-A58 DSLR Camera

- 2.7" Tilting LCD • Uses Sony Alpha mount Lenses
- SDHC, SDXC, MS Pro Duo, MS PRO HG Duo Card Slot • Full HD 1080i/p Video at 60 or 24fps
- 5fps Full Resolution Continuous Shooting
- SteadyShot INSIDE Image Stabilization
- ISO 100-16000 with Noise Reduction

DT 18-55mm SAM II Lens *#SOSLTA58K*

20 Mega Pixels

SONY a77 II DSLR Camera

- 3.0" 3-Way Tilting LCD • 12fps Shooting
- Uses Sony Alpha mount Lenses
- Full HD 1080p Video Recording at 60 fps
- SDHC, SDXC, MS Pro Duo, MS PRO HG Duo, XC-HG Duo Card Slot • ISO 25600
- Built-In Wi-Fi Connectivity with NFC

Body Only *#SOA772*

24 Mega Pixels

LENSES AND FLASHES for DSLR & Mirroless Cameras

TAMRON Six-Year Warranty

Di for both digital and film SLR cameras
Di-II for Digital SLRs Only **Di III** for mirror-less cameras Only

Rebates Expire 2-28-15

C = Canon N = Nikon P = Pentax SA = Sony Alpha SE = Sony E Mount

		** Price After Rebate	SKU #	Avail. for	Rebate	Price
Di-II	60mm f/2.0 LD IF Macro (55ø)		#TA602DI*	C, N, SA	—	524.00
Di	90mm f/2.8 Macro (55ø)		#TA9028M*	C, N, P, SA	—	499.00
Di	90mm f/2.8 SP Macro VC USD (58ø)		#TA9028VC*	C, N	$50	699.00**
Di	180mm f/3.5 LD IF Macro (72ø)		#TA18035*	C, N, SA	—	739.00
Di-II	10-24/3.5-4.5 (77ø)		#TA102435*	C, N, P, SA	—	499.00
Di-II	16-300/3.5-6.3 VC PZD (67ø)		#TA1630035DI*	C, N, SA	$30	599.00**
Di-II	17-50/2.8 XR LD IF Asph (67ø)		#TA175028*	C, N, P, SA	—	499.00
Di-II	17-50/2.8 XR VC LD IF Asph. (67ø)		#TA175028*Q	C, N	—	649.00
Di-II	18-200/3.5-6.3 (62ø)		#TA1820035*	C, N, P, SA	—	199.00
Di-III	18-200/3.5-6.3 VC (62ø)		#TA1820035S*	SE	Black or Silver	739.00
Di-II	18-270/3.5-6.3 VC PZD (62ø)		#TA18270*	C, N, SA	$50	399.00**
Di	24-70/2.8 VC USD (82ø)		#TA247028*	C, N, SA	$100	1,199.00**
Di	28-75/2.8 XR (67ø)		#TA287528*	C, N, P, SA	—	499.00
Di	28-300/3.5-6.3 XR LD (62ø)		#TA2830035XD*	C, P, SA	—	419.00
Di	28-300/3.5-6.3 VC PZD (67ø)		#TA2830035DI*	C, N, SA	—	849.00
Di	70-200/2.8 LD IF Macro (77ø)		#TA7020028M*	C, N, P, SA	—	769.00
Di	70-200/2.8 SP VC USD (77ø)		#TA7020028*	C, N, SA	$100	1,399.00**
Di	70-300/4-5.6 LD Macro (62ø)		#TA70300M*	C, N, P, SA	—	199.00
Di	70-300/4-5.6 VC USD (62ø)		#TA70300*	C, N, SA	$50	399.00**
Di	150-600/5-6.3 VC USD (95ø)		#TA1506005*	C, N, SA	—	1069.00
	1.4x SP AF Pro Teleconverter		#TA14XP*	C, N	—	224.00
	2x SP AF Pro Teleconverter		#TA2XP*	C, N	—	254.00

ZEISS Touit Mirrorless Lenses

These fully-compatible lenses with autofocus expand the capabilities of both the Sony NEX and Fujifilm X camera systems with outstanding optical quality.

	Fujifilm X	Sony NEX	Price
12mm f/2.8 (67ø)	#ZET2812X	#ZET2812E	999.00
32mm f/1.8 (52ø)	#ZET1832X	#ZET1832E	720.00
50mm f/2.8M (52ø)	#ZET5028MX	#ZET5028ME	999.00

Tokina

DX – for Digital SLRs Only **FX** – Designed for full frame DSLRs

		Canon EOS	Nikon AF	Price
FX	100mm f/2.8 Pro D Macro (52ø)	#T010028PCAF	#T010028PNAF	379.00
DX	10-17mm f/3.5-4.5 ATX Fisheye	#T0101735CAF	#T0101735NAF	549.00
DX	11-16mm f/2.8 Pro (77ø)	—	#T0111628PDXN	426.00
DX	11-16mm f/2.8 Pro II (77ø)	#T0111628PCII	#T0111628PNII	479.00
DX	12-28mm f/4.0 Pro (77ø)	#T012284DXC	#T012284DXN	449.00
FX	16-28mm f/2.8 Pro	#T01628FXC	#T01628FXN	629.00
FX	17-35mm f/4 Pro (82ø)	#T01735F4FXC	#T01735F4FXN	449.00

SIGMA

DC – for Digital SLRs Only **DG** – Optimized for Digital SLRs **DN** – Designed for Mirrorless Cameras.

** Price After Rebate

Rebates Expire 2-28-15

	H – HSM Model with Canon, Nikon, Sigma	Mount	SKU #	Rebate	Price
DC	4.5/2.8 EX Circular Fisheye HSM R	C, N, P, SI, SA	#SI4528EX*	$100	799.00**
DG	8/3.5 EX Circular Fisheye R	C, N, SI, SA	#SI835*	—	899.00
DC	10/2.8 EX Fisheye HSM R	C, N, SA	#SI1028EXDC*	—	649.00
DG	15/2.8 EX Diagonal Fisheye R	C, N, P, SA	#SI1528DG*	—	609.00
DN	19/2.8 (46ø) Black or Silver	MFT, SE	#SI1928DN*	—	199.00
DG	20/1.8 EX DF RF Aspherical (82ø)	C, N, SA	#SI2018*	—	629.00
DG	24/1.8 EX DF Asph. Macro (77ø)	C	#SI2418MCAF	—	549.00
DG	28/1.8 EX DF Asph. Macro (77ø)	C	#SI2818MCAF	—	449.00
DN	30/2.8 (46ø) Black or Silver	MFT, SE	#SI3028DN*	—	199.00
DC	30/1.4 HSM (62ø)	C, N, P, SI, SA	#SI3014DCHSM*	—	499.00
DG	35/1.4 HSM (67ø)	C, N, P, SI, SA	#SI3514*	—	899.00
DG	50/1.4 EX HSM (77ø) H	C, N, SA	#SI5014*	$100	399.00**
DG	50/1.4 HSM (77ø) H	C, N, SI, SA	#SI5014A*	—	949.00
DG	50/2.8 EX Macro (55ø)	C, N	#SI5028MDG*	—	369.00
DN	60/2.8 (46ø) Black or Silver	MFT, SE	#SI6028DN*	$30	209.00**
DG	70/2.8 EX Macro (62ø)	N, P	#SI7028MDG*	—	499.00
DG	85/1.4 EX HSM (77ø)	C, N, P, SI, SA	#SI8514*	—	969.00
DG	105/2.8 EX Macro OS HSM (62ø)	C, N, SI, SA	#SI10528MDG*	$300	669.00**
DG	150/2.8 EX APO Macro OS HSM (72ø)	C, N, SI, SA	#SI15028AMO*	—	1,099.00
DG	180/2.8 EX APO Macro OS HSM (86ø)	C, N, SI, SA	#SI18028AMEO*	—	1,699.00
DG	300/2.8 APO EX HSM (46ø Rear)	C, N, P, SI, SA	#SI30028DG*	—	3,399.00
DG	500/4.5 APO EX HSM (46ø Rear)	C, N, P, SI, SA	#SI50045DG*	—	4,999.00
DC	8-16/4.5-5.6 HSM	C, N, S	#SI8164556*	—	699.00
DC	10-20/4-5.6 EX HSM (77ø)	C, N, P, SI, SA	#SI102045D*	$80	399.00**

C = Canon MFT = Micro 4/3 N = Nikon O = Olympus P = Pentax SI = Sigma SA = Sony Alpha SE = Sony E

	R – Rear Slip-in Gelatin Filter Slot	Mount	SKU #	Rebate	Price
DC	10-20/3.5 EX HSM (82ø)	C, N, P, SI, SA	#SI102035*	—	649.00
DG	12-24/4.5-5.6 EX Asph. HSM II	C, N, SI, SA	#SI122445*	—	949.00
DC	17-50/2.8 EX OS HSM (77ø)	C, N, P, SI	#SI175028*	$150	519.00**
DC	17-70/2.8-4.0 OS Mac HSM TSC (72ø)	C, N, P, SI, SA	#SI1770284*	—	499.00
DC	18-35/1.8 HSM (72ø)	C, N, P, SI, SA	#SI183518DC*	—	799.00
DC	18-200/3.5-6.3 OS II HSM (72ø)	N, SI, SA	#SI1820035*	—	499.00
DC	18-200/3.5-6.3 OS Macro HSM (62ø)	C, N, P, SI, SA	#SI1820035D*	—	399.00
DC	18-250/3.5-6.3 OS Macro HSM (62ø)	C, N, P, SI, SA	#SI1825035M*	$200	349.00**
DC	18-300/3.5-6.3 OS Macro HSM (72ø)	C, N, P, SI, SA	#SI1830035*	—	579.00
DG	24-70/2.8 EX IF HSM (82ø)	C, N, SI, SA	#SI247028*	—	899.00
DG	24-105/4.0 OS HSM (82ø)	C, N, SI, SA	#SI24105*	—	899.00
DG	50-500/4.5-6.3 APO OS HSM (95ø)	C, N, P, SI, SA	#SI505004563*	$150	1,509.00**
DG	70-200/2.8 EX APO OS HSM (77ø)	C, N, P, SI, SA	#SI7020028*	$200	1,199.00**
DG	70-300/4-5.6 Macro (58ø)	C, N, P, SI, SA	#SI703004*	—	169.00
DG	70-300/4-5.6 APO Macro (58ø)	C, N, P, SI, SA	#SI703004DG*	—	179.00
DG	120-300/2.8 OS HSM (105ø)	C, N, S	#SI120300*	—	3,599.00
DG	120-400/4.5-5.6 APO OS HSM (77ø R)	C, P, SI	#SI120400*	—	899.00
DG	150-500/5-6.3 APO OS HSM (86ø)	C, N, P, SI, SA	#SI150500*	$200	869.00**
DG	1.4x EX APO Tele-Converter	C, N, S	#SI14XDG*	—	249.00
DG	2x EX APO Tele-Converter	C, N, S	#SI2XDG*	—	299.00

SIGMA FLASHES

DG	EF-610 ST	C, N, P, SI, SA	#SIEF610ST*	—	165.00
DG	EF-610 Super Flash	C, N, P, SI, SA	#SIEF610*	—	255.00
DG	EM-140 TTL Ringlight	C, N, P, SI, SA	#SIEM140DG*	—	379.00

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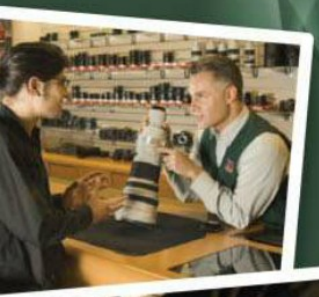

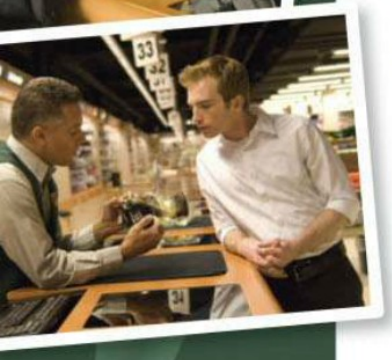

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Canon Digital Rebel T5i DSLR

- 3.0" Vari-Angle Touchscreen LCD
- Uses Canon EF Lenses (1.6x factor)
- SD/SDHC/SDXC Card Slot
- STM Lens Support for Quiet AF in Movies
- Full HD 1080 Video with Continuous AF
- ISO 100-12800, Expandable to 25600

Rebates Expire 2-28-15	Price	Rebate	Final Cost
Kit with 18-55mm IS STM *#CAEDRT5IK*	849.99	$100	749.99
T5 Kit with 18-55mm IS II *#CAEDRT5K*	549.99	$100	449.99
T3i Kit with 18-55mm IS *#CAEDRT3IK*			

Canon EOS-70D DSLR

- Dual Pixel CMOS AF with Live View
- DIGIC 5+ Image Processor
- SD/SDHC/SDXC Card Slot
- Uses Canon EF & EF-S Lenses
- 3.0" Vari-Angle Touchscreen
- 7 fps Continuous Shooting
- Built-In Wireless Connectivity
- Full HD 1080p Video

Rebates Expire 2-28-15	Price	Rebate	Final Cost
Body Only *#CAE70D*	1,199.00	$100	1,099.00
Kit with 18-55mm STM *#CAE70D1855*	1,349.00	$100	1,249.00
EOS 60D Body Only *#CAE60D*			
EOS 60D Kit with 18-135mm IS *#CAE60D18135*			

Canon EOS-7D Mark II DSLR

- 3" Clear View II LCD • Native ISO 16000
- Dual Pixel CMOS AF with Live View
- Dual CF and SDHC/XC Card Slots
- Continuous 10 fps Shooting
- Built-In GPS Receiver & Digital Compass
- Full HD 1080p/60 Video & Movie Servo AF

20 Mega Pixels

	Price	Rebate	Final Cost
Body Only *#CAE7D2*	1,799.00		
EOS 7D Body Only *#CAE7D*			
EOS 7D Kit with 18-135mm IS *#CAE7D18135*			
EOS 7D Kit with 28-135mm IS *#CAE7D28135*			

Canon EOS-6D DSLR

- Full-Frame CMOS Sensor • 3.0" LCD
- DIGIC 5+ Image Processor
- Uses Canon EF Lenses
- SD/SDHC/SDXC Card Slot
- Built-In Wi-Fi and GPS Connectivity
- Full HD 1080p with Manual Controls
- Extended ISO Range of 50-102400
- Up to 4.5 Full Resolution FPS
- Built-In HDR & Multiple Exposure Modes

Rebates (Mail-in) Expire 2-28-15	Price	Rebate	Final Cost
Body Only *#CAE6D*	1,899.00	$300	1,599.00
Kit with 24-105mm f/4 L *#CAE6D24105*	2,499.00	$300	2,199.00

Canon EOS-5D Mark III DSLR

- 3.2" Clear View High Resolution LCD
- DIGIC 5+ Image Processor
- 61-Point High Density AF
- Uses Canon EF Lenses
- Dual CF, SD Card Slots
- Full HD 1080/30p & 720/60p Formats
- Extended ISO Range (50-102400)
- Built-In HDR & Multiple Exposure Modes

Rebates (Mail-in) Expire 2-28-15	Price	Rebate	Final Cost
Body Only *#CAE5D3**	3,399.00	$300	3,099.00
Kit with 24-105mm L IS *#CAE5D324105*	3,999.00	$300	3,699.00

Canon EOS-1Dx DSLR

- Dual DIGIC 5+ Image Processors
- Magnesium Alloy Body
- Eye-Level Pentaprism Viewfinder
- 3.2" LCD Monitor
- Uses Canon EF Lenses
- Dual CF card slots
- 1920 x 1080 HD Video Capture
- Live View Still and Video Recording
- 61-Point High Density Auto Focus

18 Mega Pixels

Body Only *#CAE1DX** 5,999.00

Canon SLR Lenses and Flashes

Rebates (Mail-in) Expire 2-28-15 — Call for Current Rebates & Promotions

EOS Flash System	MAP	Rebate	Final
270EX II	169.99		
320EX			
430EX II	299.99		
600EX-RT	549.99		
MR-14EX II Ringlight	549.99		
MT-24EX Twin Flash	829.99		

EF-S Digital Lenses (Not compatible with full frame cameras)	MAP	Mail-in Rebate	Final
24/2.8 STM (52ø)	149.99		
60/2.8 USM Macro (52ø)	469.99		
10-18/4.5-5.6 IS STM (67ø)	299.00		
10-22/3.5-4.5 USM (77ø)	649.99		
15-85/3.5-5.6 IS USM (72ø)	799.99		
17-55/2.8 IS USM (67ø)	879.99		
17-85/4-5.6 IS USM (67ø)	CALL		
18-55/3.5-5.6 IS (58ø) II	199.99		
18-135/3.5-5.6 IS (67ø)	499.99		
18-200/3.5-5.6 IS (72ø)	699.99		
55-250/4-5.6 IS USM II (58ø)	249.99		
55-250/4-5.6 IS STM II (58ø)	299.99		

EF Lenses	MAP	Mail-in Rebate	Final
20/2.8 USM (72ø)	539.99		
24/2.8 IS USM (58ø)	599.99		
28/1.8 USM (58ø)	509.99		
28/2.8 IS USM (58ø)	549.99		
35/2 IS USM (67ø)	599.99		
40/2.8 STM Pancake (52ø)	199.99		
50/1.8 II (52ø)	125.99		
50/2.5 Macro (52ø)	299.99		
50/1.4 USM (58ø)	399.99		
MP-E 65/2.8 1x-5x Macro (58ø)	1,049.00		
85/1.8 USM (58ø)	419.99		
100/2 USM (58ø)	499.99		
100/2.8 USM Macro (58ø)	599.99		
400/4.0 DO IS II USM (52ø)	6,899.00		
24-105/3.5-5.6 IS STM (77ø)	599.00		
28-135/3.5-5.6 IS USM (72ø)	CALL		
70-300/4-5.6 IS USM (58ø)	649.99	$250	399.99**
70-300/4.5-5.6 DO IS USM (58ø)	1,399.00		
75-300/4.0-5.6 III (58ø)	199.99		
75-300/4.0-5.6 III USM (58ø)	234.99		

TSE MF Lenses	MAP	Rebate	Final
17/4.0 L	2,249.00		
24/3.5 L II	1,999.00		
45/2.8	1,399.00		
90/2.8	1,399.00		

EF "L" Lenses	MAP	Mail-in Rebate	Final
14/2.8 USM II	2,249.00		
24/1.4 II (77ø)	1,649.00		
35/1.4 USM (72ø)	1,479.00		
50/1.2 USM (72ø)	1,549.00		
85/1.2 USM II (72ø)	2,099.00		
100/2.8 IS USM Macro (67ø)	949.99		
135/2.0 USM (72ø)	1,049.00		
180/3.5 USM Macro (72ø)	1,499.00		
200/2.8 USM II (72ø)	779.99		
200/2.0 IS USM (52ø)	5,999.00		
300/4.0 IS USM (77ø)	1,449.00		
300/2.8 IS USM II (52ø rear)	6,599.00		
400/5.6 USM (77ø)	1,339.00		
400/2.8 IS II (52ø rear)	10,499.00		
500/4 IS USM II (52ø rear)	9,499.00		
600/4.0 IS II (52ø rear)	11,999.00		
8-15/4.0 Fish-eye USM	1,349.00		
16-35/4 IS USM (77ø)	1,199.00	$50	1,149.00
16-35/2.8 USM II (82ø)	1,699.00	$100	1,599.00
17-40/4.0 USM (77ø)	839.99	$100	739.99
24-70/4.0 IS USM (77ø)	999.99	$100	899.99
24-70/2.8 II USM (82ø)	2,099.00	$100	1,999.00
24-105/4 IS USM (77ø)	1,149.00		
28-300/3.5-5.6 IS USM (77ø)	2,549.00		
70-200/4.0 USM (67ø)	709.99	$50	659.99
70-200/4.0 IS USM (77ø)	1,299.00	$100	1,199.00
70-200/2.8 USM (77ø)	1,449.00	$100	1,349.00
70-200/2.8 IS II USM (77ø)	2,299.00	$100	2,199.00
70-300/4.0-5.6 IS USM (67ø)	1,449.00		
100-400/4.5-5.6 IS USM (77ø)	1,699.00	$200	1,499.00

EF Teleconverters	MAP	Rebate	Final
1.4x III	449.99		
2x III	449.99		

*** with purchase of EOS-6D, 7D, 7D mkII, 70D, or 60D*

Nikon D3300 DSLR

Rebates Expire 2-28-15

- EXPEED 4 Image Processor
- Full HD 1080p Video Recording
- 3.0" LCD • 5 fps Shooting
- Uses Nikon AF Lenses (1.5x factor)
- SD/SDHC/SDXC Card Slot
- Expandable ISO 25600
- Easy Panorama Mode and Guide Mode
- Nikon Inc. limited warranty included

24 Mega Pixels

D3300 is available in Black, Grey or Red	Price	Rebate	Final Cost
Kit with 18-55mm VR II *#NID33001855**	646.95	$150	496.95
D3200 Kit Black w/18-55mm VR *#NID32001855**	529.95	$80	449.95

Nikon D5500 DSLR

- EXPEED 4 Image Processor
- Full HD 1080p Video at 60 fps
- 3.2" Vari-Angle Touchscreen
- Uses Nikon AF Lenses (1.5x factor)
- SD/SDHC/SDXC Card Slot
- Built-In Wi-Fi • ISO 100-25600
- Nikon Inc. limited warranty included

Rebates Expire 2-28-15

24 Mega Pixels

D5500 18-55 Kit is available in Black or Red	Price	Rebate	Final Cost
Kit with 18-55mm VR II *#NID55001855**	999.95	—	—
D5300 Kit w/18-55mm VR II *#NID53001855**	896.95	$100	796.95
D5200 Kit with 18-55mm VR *#NID52001855**	799.95	$150	649.95

Nikon D7100 DSLR

- Magnesium Alloy Body
- Moisture Resistant
- EXPEED 3 Image Processor
- 1080p Full HD Video Capture
- Accepts Nikon AF Lenses (1.5x factor) • 3.2" LCD
- Dual SD/SDHC/SDXC Card Slots
- Built-In Flash with Commander Function
- Nikon Inc. limited warranty included

24 Mega Pixels

Rebates Expire 2-28-15

	Price	Rebate	Final Cost
Body Only *#NID7100*	1,199.95	$200	999.95
Kit with 18-140mm VR DX *#NID71018140*	1,696.95	$400	1,296.95

Nikon D750 DSLR

- FX-Format (Full-Frame) CMOS Sensor
- Uses Nikon AF Lenses • 3.2" Tilting LCD
- EXPEED 4 Image Processor
- SD/SDHC/SDXC Card Slot
- Built-In Wi-Fi Connectivity
- Full HD 1080p Video Recording at 60 fps
- Nikon Inc. limited warranty included

24 Mega Pixels

Rebates Expire 2-28-15

	Price	Rebate	Final Cost
Body Only *#NID750*	2,296.95	—	—
Kit with 24-120mm VR *#NID75024120*	3,596.95	$600	2,996.95
D610 Body Only *#NID610*	1,996.95	$500	1,496.95
D610 Kit with 24-85mm VRt *#NID6102485*	2,596.95	$600	1,996.95

Nikon D810 DSLR

- FX-Format CMOS Sensor
- EXPEED 4 Image Processor
- Optical Low-Pass Filter • 3.2" LCD
- CF & SD Dual Card Slots
- Nikon F Mount Lens Mount
- Full HD 1080p Video at 60/30/24 fps
- External Mic and Headphone Inputs
- Continuous Shooting to 5 fps in FX Mode
- Nikon Inc. limited warranty included

36 Mega Pixels

Rebates Expire 2-28-15

	Price	Rebate	Final Cost
Body Only *#NID810*	3,296.95	$300	2996.00
Kit with 24-120mm VR *#NID81024120*	4,599.95	$900	3,699.95

Nikon D4s DSLR

- FX-format (full-frame) CMOS Sensor
- 14-Bit RAW Files & 12-Bit RAW S Format • 3.2" LCD
- Full HD 1080p Video at 60 fps
- EXPEED 4 Image Processor
- Compatible with Most Nikkor Optics
- 11 fps Shooting for 200 Shots with AE/AF • ISO 50-409600
- CF Type 1 & XQD Compatible
- 1000 Base-T Gigabit Wired LAN Support
- Nikon Inc. limited warranty included

Body Only #NID4S 6,496.95

16 Mega Pixels

Nikon SLR Lenses and Flashes

Rebates Expire 2-28-15 — Call for Current Rebates and Promotions

Nikon Instant Savings on Lenses with purchase of any Nikon DSLR

AF Flashes	Price	Rebate	Final
SB-300	146.95		
SB-500	246.95		
SB-700	326.95		
SB-910	546.95		
R1 Wireless Twin Flash			
R1C1 Wireless Twin Flash System			

DX ED-IF Lenses for Digital Only	Price	Rebate	Final
10.5/2.8 Fish-Eye			
35/1.8 G AF-S (52ø)	196.95	$20	176.95*
40/2.8 G AF-S Micro (52ø)	276.95	$30	246.95*
85/3.5 G ED VR Micro	526.95	$100	426.95
10-24/3.5-4.5 G AF-S (77ø)	899.95	$100	799.95*
12-24/4 G AF-S (77ø)			
16-85/3.5-5.6 G AF-S VR (67ø)	699.95	$100	599.95
17-55/2.8 G AF-S (77ø)			
18-55/3.5-5.6 G AF-S II (52ø)			
18-55/3.5-5.6 G AF-S VR (52ø)	196.95		
18-55/3.5-5.6 G AF-S VR II (52ø)	246.95		
18-105/3.5-5.6 G AF-S VR	396.95		
18-140/3.5-5.6 G AF-S VR **	496.95	$200 **	296.95
18-200/3.5-5.6 G AF-S VR II	596.95	$100	496.95*
18-300/3.5-5.6 G AF-S ED VR (77ø)	996.95	$100	896.95*
18-300/3.5-6.3 G AF-S ED VR (67ø)	896.95	$100	796.95
55-200/4-5.6 G AF-S (52ø)			
55-200/4-5.6 G AF-S VR II	346.95	$200	146.95
55-300/4.5-5.6 G AF-S VR	396.95	$150	246.95

D-Type AF Lenses	Price	Rebate	Final
14/2.8 D ED			
16/2.8 D (39ø) with Hood			
20/2.8 D (62ø)			
20/1.8 G AF-S ED (77ø)	796.95		
24/2.8 D (52ø)			
24/1.4 G AF-S ED (77ø)	2,199.95	$200	1,999.95
24/3.5 D ED PC-E (77ø)			
28/1.8 G AF-S (67ø)	696.95	$100	596.95*
28/2.8 D (52ø)			
35/2.0 D (52ø)			
35/1.4 G AF-S ED (67ø)	1,799.95	$200	1,599.95
35/1.8 G AF-S ED (58ø)	596.95	$100	496.95*
45/2.8 D ED PC-E Micro (77ø)			

D-Type AF Lenses	Price	Rebate	Final
50/1.8 D (52ø)			
50/1.8 G AF-S (58ø)	216.95	$20	196.95*
50/1.4 D (52ø)			
50/1.4 G AF-S (58ø)	484.95	$85	399.95*
58/1.4 G AF-S (72ø)	1,696.95	$200	1,496.95
60/2.8 D Micro (62ø) (1:1)			
60/2.8 G AF-S ED Micro (62ø)	599.95	$100	499.95
85/1.8 G AF-S (67ø)	496.95	$50	446.95*
85/1.4 D IF (77ø)			
85/1.4 G AF-S (77ø)	1,699.95	$200	1,499.95*
85/2.8 PC-E Micro (77ø)			
105/2.8 G AF-S ED-IF VR Micro (62ø)	984.95	$185	799.95*
105/2.0 DC D with Hood (72ø)			
180/2.8 D ED-IF (72ø)			
200/4 D ED-IF Micro with Case (62ø)			
200/2 G AF-S ED-IF VR II (52ø)			
300/4.0 D AF-S ED-IF (77ø)			
300/2.8 G AF-S VR (52ø-R)			
500/4.0 G AF-S VR ED (52ø)			
600/4.0 G AF-S VR ED (52ø)			
14-24/2.8 G AF-S ED-IF	1,996.95	$200	1,796.95*
16-35/4.0 G AF-S ED VR (77ø)	1,256.95	$260	996.95*
17-35/2.8 D AF-S ED-IF (77ø)			
18-35/3.5-4.5 AF-S G ED (77ø)	746.95	$100	646.95
24-70/2.8 G AF-S ED-IF (77ø)	1,886.95	$200	1,686.95*
24-85/2.8-4.0 D IF (72ø)			
24-85/3.5-4.5 G AF-S ED VR	596.95	$100	496.95
24-120/4.0 G AF-S ED VR (77ø)	1,296.95		
28-300/3.5-5.6 G AF-S ED VR	1,046.95	$250	796.95^
70-200/4.0 G AF-S ED VR (67ø)	1,396.95	$200	1,196.95*
70-200/2.8 G AF-S ED-IF VR II (77ø)	2,396.95	$300	2,096.95*
70-300/4.0-5.6 G (62ø)			
70-300/4.5-5.6 G-AFS VR	586.95	$200	386.95
80-200/2.8 D with Collar (77ø)			
80-400/4.5-5.6 G AF-S ED VR (77ø)	2696.95	$400	2,296.95*
200-400/4 G AF-S ED VR II (52ø)			
TC-14E III (1.4x) Teleconverter			
TC-17E II (1.7x) Teleconverter	499.95	$20	479.95
TC-20E III (2x) Teleconverter	549.95	$50	499.95

* Stand Alone Rebate, No Purchase of DSLR Necessary
** When purchased with a D3200, D3300, D5200, D5300, D7100
^ When Purchased with D7100, D610, D750, DF, D810 D4s

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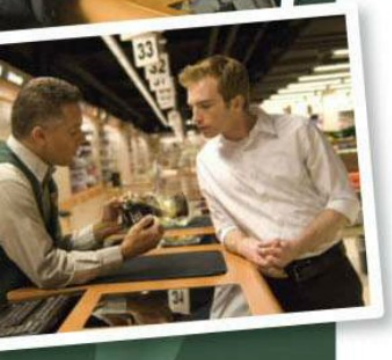

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Canon Powershot G16

- 3.0" LCD • Full HD 1080/60p Video
- 5x Optical Zoom • 4x Digital Zoom
- 6.1-30.5mm f/1.8-2.8 (35mm equiv: 28-140mm) • SD/SDHC/SDXC Card Slot
- Enhanced Wi-Fi Capabilities
- Continuous Shooting at 9.3 fps

Expires 2-28-15

#CAPSG16.....499.99 .....***Less $50 Rebate***....**449.99**

12 Mega Pixels

FUJIFILM X30

- 2.8" LCD • Die-Cast Magnesium Alloy
- Full HD 1080 Video at 60fps
- 4x Optical Zoom • ISO 100-12800
- 7.1-28.4mm f/2-2.8 (35mm equiv: 28-112mm) • SD/SDHC/SDXC Card Slot
- Film Simulation and Advanced Filters

Black or Silver *#FUX30**

12 Mega Pixels

Nikon Coolpix A

- 3.0" LCD • No Optical Low-Pass Filter
- Manual Focus Ring Adjustment
- 18.5mm f/2.8 (35mm equiv: 28mm)
- SD/SDHC/SDXC Card Slot
- Full HD 1080p Video with Stereo Sound
- Capture Photos in RAW Format

Black or Silver *#NICPA**.....**1,099.95**

16 Mega Pixels

OLYMPUS Stylus XZ-2 iHS

- 3.0" Swiveling Touchscreen LCD
- 4x Optical Zoom • 2x Digital Zoom
- 6-24mm f/1.8-2.5 (35mm equiv: 27-108mm) Lens • 11 Art Filters
- SD/SDHC/SDXC Card Slot
- Full HD 1080p Video Recording

#OLXZ2B

12 Mega Pixels

Panasonic Lumix DMC-LX7

- 3.0" LCD • SDHC/SDXC Card Slot
- Full HD 1080 Video Recording
- 3.8x Optical Zoom • 7.5x Digital Zoom
- 4.7-17.7mm f/1.4-2.3 (35mm equiv: 24-90mm) Leica Vario-Summilux Lens
- RAW and RAW+JPEG Recording Options

Black or White *#PADMCLX7**

10 Mega Pixels

SONY CyberShot DSC-RX100 III

- 3.0" Multi-Angle Xtra Fine LCD
- 2.9x Optical Zoom • 11x Digital Zoom
- 8.8-25.7mm f/1.8-2.8 (35mm equiv: 24-70mm) Carl Zeiss Vario-Sonnar T* Lens
- MS Pro Duo/Pro HG-Duo, SDHC/SDXC Card Slot • Full HD Video • Built-In Wi-Fi with NFC

#SODSCRX100M3

20 Mega Pixels

MEMORY CARDS

CF Compact Flash

	Delkin				Kingston		Lexar		Sandisk		
	500x	700x	1000x	1050x	Ultimate 266x	Ultimate 600x	800x	1066x	Ultra 50MBs	Extreme 120MBs	Extreme Pro 160MBs
16GB	29.95	37.95	49.95	—	21.95	33.95	40.95	48.95	29.95	39.95	53.95
32GB	44.50	54.99	74.95	89.95	30.95	49.95	46.99	79.99	49.99	58.95	83.39
64GB	84.50	72.50	99.95	159.95	49.95	—	72.95	124.00	—	89.00	149.00
128GB	—	194.95	214.00	254.95	—	—	194.95	249.98	—	199.95	279.95
256GB	—	—	—	—	—	—	399.95	543.91	—	—	569.95
512GB	—	—	—	—	—	—	899.00	—	—	—	—

XQD High-Speed for Nikon D4

	Lexar	Sony	
	Professional 1333x	N Series 125MBs	G Series 400MBs
32GB	99.95	99.95	163.50
64GB	148.95	189.95	359.95

SDHC Secure Digital High Capacity

	Delkin	Kingston	Sandisk	
	Pro Class10	Micro Class 4 Mobility	Standard Class 4	Micro Class 4
4GB	7.95	—	4.95	4.75
8GB	9.95	9.41	5.95	5.95
16GB	10.95	9.95	14.95	8.95
32GB	17.95	19.80	15.95	16.95

CFast 2.0 High Speed

High-speed file transfer to meet the demands of broadcast, cinema, and photography.

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60GB (450mbs).... **399.95**		*32GB*.....**179.99**	*128GB*.....**640.79**
128GB (515mbs).. **799.95**		*64GB*.....**352.43**	*259GB*.....**1,067.99**

UHS1 Ultra High Speed / UHS1 Speed Class 3 (U3) / UHS2

		Lexar			Sandisk			Sony		Delkin	Kingston	Sandisk		Sony	Delkin	Lexar		Sandisk
		Class 10 400x	600x	Micro 633x	Extreme 80MBs	Extreme Pro 95MBs	Micro 80MBs	Class 10 94MBs	Micro	633x	90MBs	Extreme 60MBs	Extreme Pro 90MBs	95MBs	U3 280MBs	1000x 150MBs	2000x 300MBs	Extreme Pro 280MBs
SDHC	**8GB**	—	—	—	19.15	—	—	12.49	7.75	17.95	—	—	—	—	—	—	—	—
SDHC	**16GB**	14.95	14.97	23.95	24.95	29.95	24.95	19.95	9.95	31.95	22.95	14.99	—	—	64.95	21.24	—	64.99
SDHC	**32GB**	23.95	23.95	34.95	37.95	39.95	34.95	26.95	16.95	38.95	39.95	24.99	—	39.95	114.95	32.75	74.95*	114.95
SDXC	**64GB**	36.95	42.09	66.95	64.95	78.99	62.95	39.95	32.95	84.95	79.95	49.95	—	75.95	—	56.93	127.83*	224.99
SDXC	**128GB**	—	81.95	—	137.95	—	—	79.95	—	149.95	—	—	147.95	—	—	99.95	—	—
SDXC	**256GB**	—	171.89	—	—	—	—	—	—	359.95	—	—	299.95	—	—	320.58	—	—
SDXC	**512GB**	**Note:** Not all devices support SDXC cards						—	—	—	—	—	599.95	—	—	* with USH-II Reader		—

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- Included padded carry bag

Model	Ball Head	Load Capacity	Max. Height	Folded	Weight	SKU #	Price
Anodized Aluminum Tripods							
AT-3421	BA-106T	6.6 lb	59"	16.8"	2.7 lb	#OBAT3421106T	**$159.95**
AT-3431	BA-108T	8.8 lb	61.3"	17.3"	2.8 lb	#OBAT3431108T	**$199.95**
AT-3441	BA-111T	11 lb	63.4"	17.5"	3.5 lb	#OBAT3441111T	**$249.95**
AT-3451	BA-113T	13.2 lb	65.5"	18.1"	3.6 lb	#OBAT3451113T	**$289.95**
AT-3461	BA-117T	17.6 lb	67.1"	189"	4.5 lb	#OBAT3461117T	**$299.95**
6x Carbon Fiber Tripods							
CT-3431	BE-108T	8.8 lb	59.5"	17"	2.5 lb	#OBCT3431108T	**$399.95**
CT-3451	BE-113T	13.2 lb	61.3"	17.1"	2.5 lb	#OBCT3451113T	**$479.95**
CT-3461	BE-117T	17.6 lb	64.5"	17.4"	3.1 lb	#OBCT3461117T	**$479.95**
CT-3481	BE-126T	26.4 lb	68"	18.9"	3.8 lb	#OBCT3481126T	**$499.95**
CT-3521	BE-106T	6.6 lb	56.4"	14.8"	2.4 lb	#OBCT3521106T	**$379.95**
CT-3531	BE-108T	8.8 lb	60.8"	15.5"	2.5 lb	#OBCT3531108T	**$399.95**
CT-3551	BE-113T	13.2 lb	62.4"	16"	2.6 lb	#OBCT3551113T	**$469.95**
CT-3561	BE-117T	17.6 lb	64.3"	16.8"	3.1 lb	#OBCT3561117T	**$349.95**
CT-3581	BE-126T	26.4 lb	67.9"	16.9"	3.9 lb	#OBCT3581126T	**$369.95**

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for Canon 60D	BG-C6	#VEBGC6	$69.95
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Close Up Set (+1, +2, +4)	39.99	47.35	53.00	63.00	68.00
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100	120 Roll	4.50
400	135-36	6.29
400	120 Roll	4.95
3200	135-36	10.99
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TMX 100	135-36	4.95
TMX 100	120 Roll	4.49
TMY 400	135-36	4.95
TMY 400	120 Roll	4.59
BW 400CN	135-36	8.89

HANDHELD Shooting Technique

When photographing wildlife, sometimes you just have to work "legs-free"

Wildlife photography is challenging in any circumstances. To get great images, you have to understand behavior and be observant to predict those key moments—times when all the elements in the frame come together. In a perfect world, the animals will be considerate enough to restrict their movements such that we can frame them up and lock down the camera on a sturdy tripod. That's seldom the case.

A lot of wildlife photographers use gimbal heads, which provide a measure of steadiness while allowing you to move the camera and follow the action. If you don't have a gimbal head, however, you'll probably be handholding, and because you'll be doing it with long lenses, technique is critically important for achieving sharp photos.

Think of your body as a tripod. To keep the camera steady in your hands, start by thinking about your feet. Take a comfortable stance, with your feet slightly wider than shoulder-width apart. Your right foot should be roughly perpendicular to the direction your lens is pointing and your left foot should be slightly to the left and pointing about 5 to 10 degrees to the right. Golfers would call this an open stance. This gives you a very stable base. Cameras are biased to right-handed and right-eye-dominant photographers in the way the shutter button is positioned. Because of that fact, even most lefties take this right-handed stance.

Because a lower center of gravity is inherently more stable, kneeling or even sitting can give you a better foundation than standing up. If you're kneeling, maintain a similar "right leg back, more or less perpendicular to the subject, and left leg forward" position. If there's a convenient rock, go ahead and sit.

Moving up from your legs, keep your back straight and your shoulders relaxed. Your feet, hips and torso should all be parallel. Tension in your shoulders, in particular, tends to promote some camera shake. Bring your arms into your sides, pressing your elbows into your rib cage slightly. Don't squeeze. By pressing your elbows against your ribs, you're really just ensuring that you don't let your arms fly out, which is very unstable.

With your arms in tight to the body, you'll naturally take a proper grip on the camera and lens. You want to cradle both as much as possible. Position your left hand under the lens, with your thumb and forefinger closest to the subject. Grip the camera body such that your index finger rests comfortably on the shutter button and, if possible, have the heel of your hand supporting the body. If you have small hands or a large camera body, or both, don't worry so much about trying to get the right hand under the body. Taking a grip that places your finger on the shutter button is more important because, if you have to reach for the shutter, you'll tend to jerk the camera as you shoot. You can also get a little added stability by pressing the camera against your head as you look through the viewfinder. Don't go crazy, though. Slight pressure is all it takes.

With the proper stance, body position and grip, you'll have a good platform. That's 90% of the battle. To get the last 10%, here are a couple of helpful pro tips. First, when you depress the shutter button, be sure to press straight down. A lot of photographers inadvertently use the index finger as if pulling the trigger on a gun. That creates a jerking motion, which is an absolute sharpness killer. Second, set your camera to multishot mode and shoot in bursts. This is a great technique because the camera naturally steadies out as you press and hold the shutter. Do a test, and you'll see that the first exposure in a sequence has some blur, it's less in the second, and by the third frame, you'll be at maximum sharpness.

One final note: Everyone's minimum handholding speed is different. The rule of thumb of 1/focal length = minimum handholding shutter speed will just get you in the ballpark. Do your own tests to see what your minimums are with all of your lenses, and when it comes to wildlife, take into account that you'll probably be excited in a moment of action and you'll be less steady, so adjust your shutter speed accordingly. **OP**

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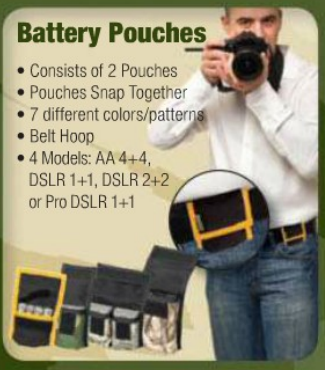

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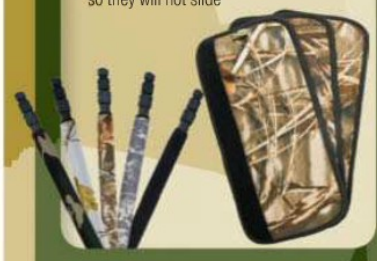

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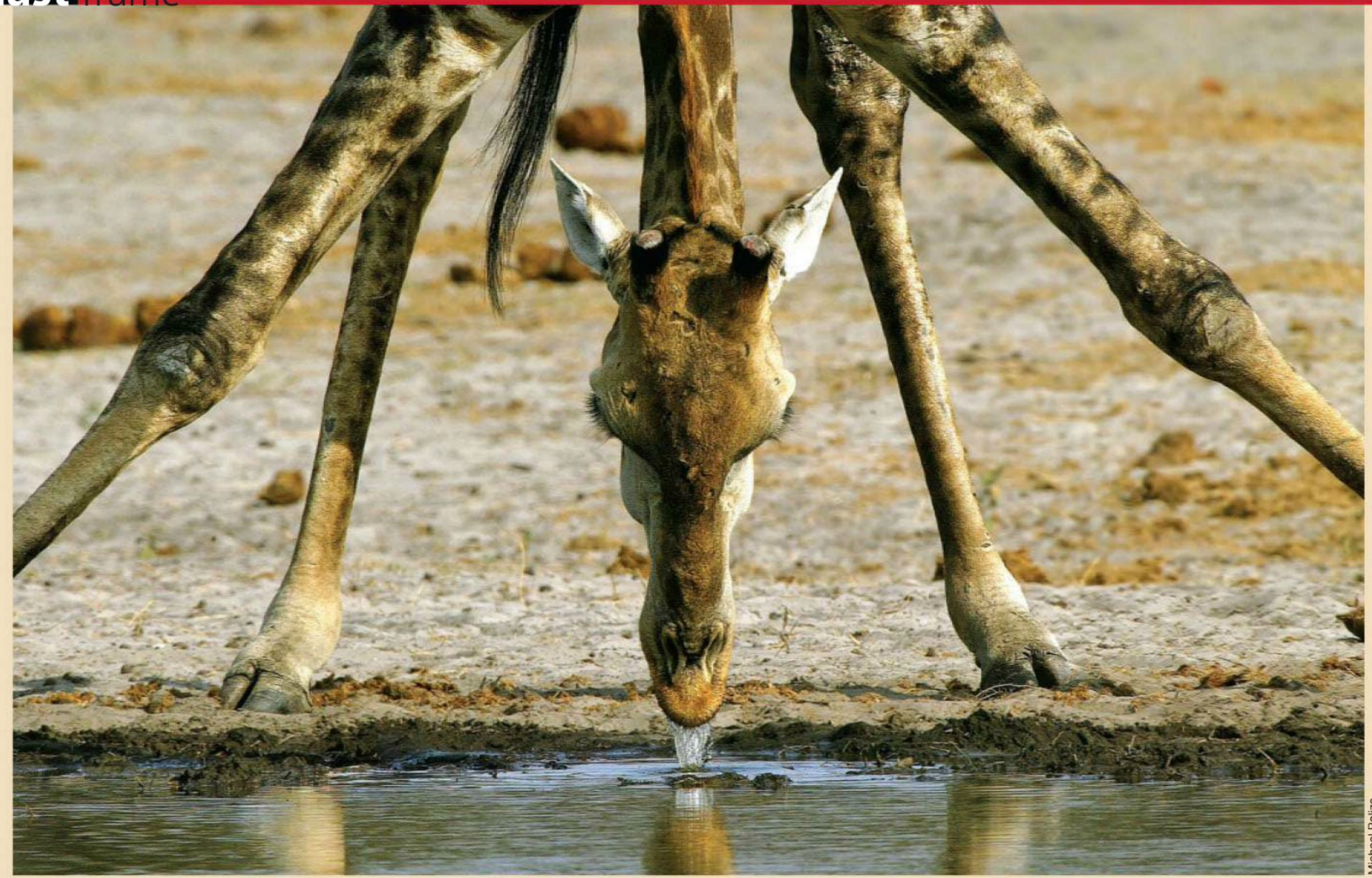

Michael Poliza

Talk About Putting Your Neck On The Line!

Capturing the symmetrical alignment of this giraffe's legs while it bowed down to take a drink of water was a test of patience for German wildlife and landscape photographer Michael Poliza, who had to quietly lie flat on the floor of his vehicle while balancing a 30-pound telephoto lens. But for the giraffe, the task of getting into this position is a bigger pain in the neck! Taken at the Zibalianja Lagoon in the Linyanti Wildlife Reserve, Botswana, Poliza explains, "It usually takes a brief eternity before a giraffe feels safe enough to spread its legs wide and bow its long neck down to the water. This is because it's the only moment when the giraffe—which, due to its imposing height, has nearly no natural enemies—is extremely susceptible to attack and can't defend itself. By the time it can move its spread-eagled legs, the lion has already had plenty of opportunity to seize it by the neck. So the giraffe often teeters at the watering hole for hours, looking to the left and to the right, checking for scents until it feels secure enough to lower its head."

To see more of Poliza's work, visit www.michaelpoliza.com.

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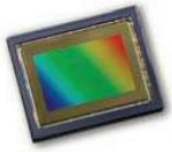

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